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Bureau of Land Management

Fuels Management, Resilient Landscapes, Sage-Grouse and Habitat Management Projects in Utah

State Director's Fuels and Integration Field Tour

May 16-17, 2017

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Utah State Director's Fuels and Integration Field Trip

16 – 17 May 2017

U.S. DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

Tuesday, 16 May 2017 – Day One

08:30 RT-130 Fire Refresher - Utah Cultural Celebration Center – optional
12:30 RT-130 Fire Refresher – Complete

13:00 Depart Utah State Office
13:30 Northern Utah Interagency Fire Center
Introduction and Logistics – Brad Washa, Utah BLM State Fuels Specialist
Utah CatFire – Nate Barrons – Utah FFSL
Smoke Program – Dan Washington – Interagency Smoke Management Coordinator
14:00 Depart NUIFC
15:30 Scipio (1 hr 23 min - 101 miles) – Meet south side of town at triangle and Hwy 50 (Mile Marker 132)
Overview Area – Erik Valdez and Brad Jessop - WDD
JFSP SageSTEP – Bruce Roundy - BYU
16:00 Depart Scipio
15:00 Greenville Bench – Beaver (1 hr 4 min - 79 miles)
Meet at South Creek Chevron (South interchange Beaver west side) Overview of watershed scale projects, fire history, sage grouse and big game.
Project Overview - Paul Briggs, Melanie Mendenhall
Farm Bill and their Sage Grouse Initiative – Lynn Kitchen - NRCS
17:30 Stop at Fremont or U-20 exit discuss watershed scale NEPA efforts and 106 process.
Project Overview - Paul Briggs, Melanie Mendenhall and Laurel Glidden
Utah BLM Healthy Lands Efforts – Tom Adamson, Utah BLM WRI Coordinator
UPCD – Utah Watershed Restoration Initiative – Tyler Thompson, Utah DNR

18:30 Arrive in Cedar City (RON)
Dinner at Sonny Boys BBQ
Please try to make reservations for hotel near southern Cedar City exit and Providence Center (Hampton Inn, Marriott Springhill Suites or Holiday Inn Express)
Good location for running and VASA Fitness next to Hampton Inn and part of Healthways

Wednesday, May 17, 2017 – Day Two

07:00 Color Country District Office (30 minutes)
Introduction and Logistics – Brad Washa, Utah BLM State Fuels Specialist
07:30 Depart Cedar City for Yellow Jacket (1 hr. 30 min)
09:00 Yellow Jacket (1 hr. 30 min)
Overview of Project – Shawn Peterson, KFO
Local Rancher and Permittee – Hal Hamlin
Sage Brush Science Framework – Doug Havlina, NIFC Fire Ecologist
10:30 Depart Yellow Jacket for Kanab (40 min)

BLM Library
Denver Federal Center
Bldg. 50, OC-521
P.O. Box 25047
Denver, CO 80225

11:10 Kanab Stop (15-minute Break)
11:25 Kanab to Upper Kanab Creek (30 min)
11:55 Upper Kanab Creek (1 hr. 5 min)
Lunch at Upper Kanab Creek - Come with lunch as limited opportunity for group of this size to get feed in timeframe.
Overview of Project/Panguitch PHMA – Vicki Tyler, KFO Mgmt,
Sage Grouse Research – Dr. Nichole Frey, Utah State University
Economic Impacts of Sagebrush Steppe Restoration - Josh Sidon,
Economist, National Operations Center
13:00 Depart Upper Kanab Creek for Tod's Junction (45 min)
13:45 Tod's Junction (15-minute break)
14:00 Depart Tod's Junction for South Canyon (45 min)
14:45 South Canyon (1 hr. 15 min)
Overview of Project – Shawn Peterson, KFO,
Local Utah Division of Wildlife Resources – Josh Pollock and Gary Bezzant
16:00 Depart South Canyon for Buckskin (35 min)
16:35 Buckskin (South Beaver), Wrap-up – all (30 min)
17:05 Depart Buckskin for Cedar City (35 min)
17:40 Return to Cedar City

18:20 Ed and Abbie departing CDC to BOI via SLC (Flight Numbers DL 7380 and DL 4486)

Thursday, 18 May 2017

08:00 Depart Cedar City for Salt Lake City

Participants

- Ed Roberson - Utah BLM State Director[1]
- Anita Bilbao - BLM Utah Associate State Director
- Abbie Jossie – BLM Utah Deputy State Director for Resources[1]
- Jessica Wade - BLM Utah State Fire Management Officer
- Douglas Havlina – NIFC Fire Ecologist[2]
- Josh Sidon - Economist, National Operations Center[3]

Utah State Office
- J. Bradley Washa, Utah BLM State Fuels Specialist[4]
- Tom Adamson, Utah BLM WRI Coordinator
- Melanie Beckstead, USO Grants and Agreements
- Dan Washington, Interagency Smoke Management Coordinator[5]

Interagency Partners
- Tyler Thompson, Utah DNR
- Nate Barrons, Utah Forestry, Fire & State Lands
- Dr. Nichole Frey, Utah State University

- Josh Pollock, DWR Wildlife Biologist
- Gary Bezzant, DWR Wildlife Biologist
- Local Rancher – Hal Hamblin
- Bruce Roundy, BYU
- Lynn Kitchen - NRCS

West Desert District

- Erik Valdez, West Desert Fuels Specialist
- Brad Jessop, West Desert NRS
- Kevin Oliver, WDD District Manager
- Justin Kincaid, West Desert FMO

Cedar City District

- Paul Briggs, Color Country BLM Fuels Specialist
- Shawn Peterson, Color Country BLM Fuels NRS
- Melanie Mendenhall, Color Country BLM Fuels NRS
- Vicki Tyler, Color Country BLM District Sage Grouse Biologist
- Laurel Glidden, Color Country BLM Fuels Archeologist
- Harry Barber, Kanab Field Manager
- Jeremy Cox, Color Country Fuels Specialist – Detail
- Whitney Bunting – Kanab AFOM

[1] Ed and Abbie departing CDC at 18:20 to BOI via SLC (Flight Numbers DL 7380 and DL 4486)

[2] Arriving and Departing out of SLC – Will take TRAX to USO on Tuesday - UTA TRAX is available from the airport on Green Line to Arena Station. At the Arena Station you can transfer to the Blue Line headed to Central Station. Get off at the next stop at Planetarium Station and save yourself one block of walking. Could also got off at North Temple TRAX/FrontRunner Station and walk through the Gateway Mall to Gateway 3 Office Building ($2.50)

[3] Arriving into SLC – Will take TRAX to USO on Tuesday. Wednesday after tour Color Country District will provide transportation to St. George for flight back to Denver out of SGU on Thursday morning.

[4] Will be traveling onto Moab on Thursday morning to put on WFDSS Training

[5] Will not be traveling with group and only going down to NUIFC

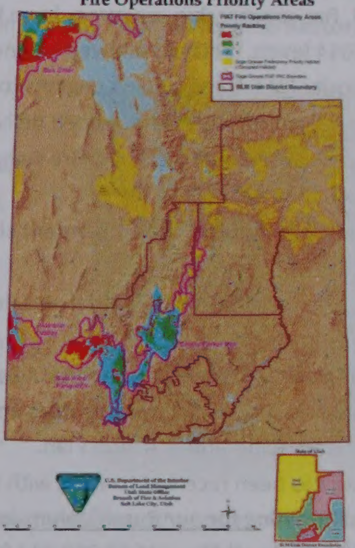
Utah BLM Fire and Fuels Sage-Grouse Efforts – 2016 Update

Under Secretarial Order 3336-Rangeland Fire Prevention, Management and Restoration, the Fire and Invasive Assessment Tool (FIAT) Assessment, and the Resilient Landscape Program, Utah Bureau of Land Management has been able to not only continue, but increase its efforts to conserve, maintain, and restore sagebrush landscapes across the state. These types of efforts within Utah were important in the U.S. Fish and Wildlife Service (USFWS) determination that the Greater Sage-Grouse does not warrant protection under the Endangered Species Act and have increased the overall state-wide population within Utah. The following highlights how the Secretarial Order, FIAT, and Resilient Landscapes are being incorporating and capitalized within the Utah BLM Fire and Fuels programs:

Overarching

- The fire management program was involved with supporting and writing the **Utah BLM Resource Management Plan Amendment** that covers 5.4 million acres of federal land within Utah. In response to the Amendments, **updates to the Fire Management Plans** are occurring for all of Utah.
- The **Fire and Invasive Assessment Tool (FIAT) analysis** was conducted on six Sage-Grouse Project Planning Areas within the Great Basin and western Utah that priorities fuels management, habitat restoration and recovery, fire operations, and post-fire rehabilitation. Utah was part of both the Southern and Northern Great Basin Greater Sage-Grouse Wildfire, Invasive Annual Grasses, and Conifer Expansion Assessments. The FIAT Assessments covered offices in Cedar City, Salt Lake City, and Richfield.
- The **Sagebrush Management Resistance and Resilience Tool** (SMRRT) is being developed for the Rocky Mountains and includes Greater Sage-Grouse populations in northeastern Utah.

2015 Utah Sage Grouse
Fire Operations Prioirty Areas



Fuels Management

- In FY2016, $7,354,265 in Fuels funding is going towards **treatments and activities related to Sage-Grouse**. In addition, $2,009,000 in Wildlife (L1100) funding has been added to this effort for implementation and monitoring of projects. These funds contribute to a treatment target of 69,810 acres within Sage-Grouse habitat in Utah. The high FY2016 target is in part from FY2015 funds received late in the year and accomplishments carrying over into the next fiscal year.
- Since FY2014, Utah has seen a $2.5 million dollar reduction in its Fuels Budget. **$6,741,500 in unfunded capacity** within Sage-Grouse habitat has been identified within Utah for FY2016. This

includes $1,200,000 identified as a critical need for the Sheeprock Priority Habitat Management Area (PHMA). This population of Sage-Grouse is on the brink of being lost and has become a priority within Utah as an adaptive management hard trigger is being approached. The State of Utah has identified a potential contribution towards BLM Lands within the Sheeprocks of $250,000 for planning and cultural clearances and another $1,000,000 for implementation through a Natural Resource Conservation Service (NRCS) grant.

- In the three year Program of Work for FY2017-2019, Utah BLM **has identified a capacity** to treat 245,419 acres for $28,076,852 in Planned Direct Costs within Sage-Grouse habitat. An additional $15,855,500 in contributed funds have been identified to further support these efforts.
- The **Southern Utah Resilient Landscape Proposal** is one of ten Collaboratives selecting in the Department of Interior's Resilient Landscape Program. In FY2015, the collaborative was funded at $2,605,000, accomplishing 22,374 acres within Sage-Grouse habitat. The Resilient Landscape funds were leveraged with other Fuels, Wildlife, and Healthy Lands funds along with outside funding from the Utah Watershed Restoration Initiative for the total of $5,252,500 going towards implementation. In FY2016 an additional $3.5 million in funding was received for over 27,000 acres in accomplishment. The goal of the Southern Utah Resilient Landscape Collaborative is to conserve, maintain, and restore sage brush communities to be resilient towards wildland fire and invasive species at a landscape scale while connecting and expanding existing populations and habitat of Greater Sage-Grouse and sage brush obligate species while providing for the resiliency of these species.

FY2003 to FY2016 Utah BLM Fuels Funds Spent & Acres Accomplished on Sage-Grouse by Year

Year	Acres	Funding
2003	4,309	$708,526
2004	5,947	$467,346
2005	6,349	$811,100
2006	10,302	$858,750
2007	29,171	$1,841,638
2008	29,066	$1,327,300
2009	51,668	$3,736,104
2010	40,598	$3,335,928
2011	30,292	$3,650,618
2012	52,935	$4,733,368
2013	16,381	$1,994,600
2014	57,222	$4,571,597
2015	29,697	$4,523,698
2016	73,771	$7,354,265
Total	**437,708**	**$39,914,838**

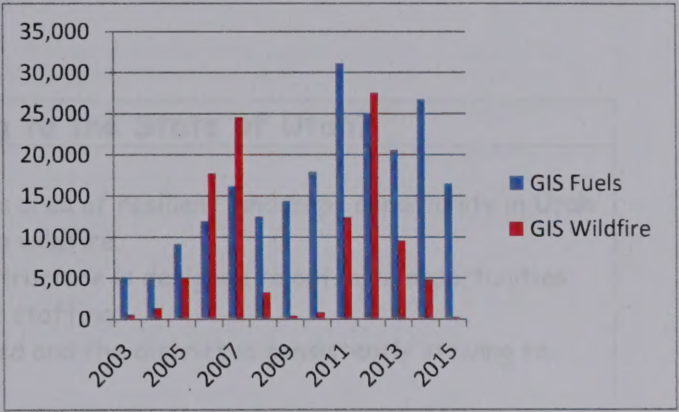
Fire Operations

- Across Utah BLM, **fire suppression resources have been increased** by roughly 10% for almost $1.2 million in additional funding over FY2014 levels. This has allowed engines that have been sitting idle because of budget reductions to be fully staffed within priority FIAT areas, adding engines to Fire Stations at Muskrat, Vernon, Fillmore, and Cedar City.
- Two new fire dozers and transports have been delivered and staffed in Cedar City and Salt Lake for wildfire response.
- All fire zones have **updated their National Fire Danger Rating Operations plans** to guide draw down and step-up levels and preparedness level plans.
- Processes are in place to **request and implement short–term severity, national severity, and pre-positioning funding** when needed.
- **Standardized Sage-Grouse briefing material** was developed for inclusion into Incident Management Team briefing packages.
- Provided **maps of priority Sage-Grouse habitat** to all personnel.
- **Briefed BLM firefighters, agency administrators and cooperators** on the components of the Fire Operations Action Plan.
- Additional funding has been received to work with the State of Utah and provide **additional training for our Rural/Volunteer Fire Departments**. In FY2015 and FY2016, an additional $40,000 and $88,000 respectively allowed BLM Utah to coordinate with our state partners and train Rural and Volunteer Fire Departments at the Utah State Engine Workshop.
- In FY2015, an additional $40,000 was received to help in implementing **Sage-Grouse habitat fire prevention campaigns** with $20,000 received in FY2016. The funds went toward billboards, radio and television PSA's. Messaging will focus on wildfire impacts to the Steppe Ecosystem, Sage-Grouse and prevention of wildfire.
- All of Utah's **prevention plans** were updated with Steppe Ecosystem and Sage-Grouse information.

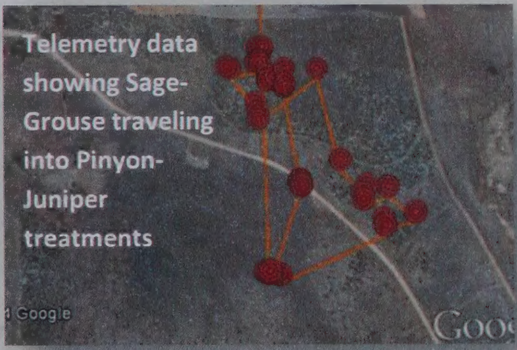
Cedar City Fire Dozer

Building on Success - Efforts to work in sagebrush ecosystems with benefits towards the Sage-Grouse have been an ongoing effort of the Utah BLM and many of our partners.

- Since 2003 the Fuels Management Program has **treated over 400,000 acres** in Sage-Grouse habitat with an **investment of nearly $40 million** in Fuels Funding. Many of these projects have been at a **landscape scale working to connect and expand** existing populations of Sage-Grouse.
- Based on GIS data, the **return on investment is making a difference within Utah**, since 2003 when an influx of funding occurred out of the National Fire Plan, fuels treatments have occurred on 211,573 acres of BLM Lands within Sage-Grouse Habitat. During this time 108,406 acres have burned in wildfires within the same Sage-Grouse Habitat, **almost half of the fuels treatment acres**. In 2015, only 203 acres of Sage-Grouse habitat was burned on BLM Lands within Utah. More acres were burned through prescribed fire at 933 acres throughout the state in FY2015.



- Another benefit identified from the fuels treatment is **resiliency from wildfires**. The Berry Fire from 2015 is one example where no Emergency Stabilization and Rehabilitation funds were requested as successful seeding following a fuels treatment reduced the threat of cheat grass invasion on the site. This allowed limited ESR Funds to go towards other priorities. In all, only 74 acres of Sage-Grouse habitat were seeded following wildfires in FY2015 with a combination of ESR and Fire Trespass Funding.
- While large fire occurrence is a concern within Utah, dealing with (treating) the **encroachment of pinyon-juniper** has been one of Utah's greatest strengths in expanding and increasing Sage-Grouse habitat. Monitoring data, from Sage-Grouse with GPS devices, is showing birds moving into newly treated areas and occupying areas where heavy equipment is working.
- BLM's work with the Utah Partners in Conservation and Development and their **Watershed Restoration Initiative has leveraged funds** beyond what the BLM could do alone. The Initiative is able to **more than double the BLM's investment**, working cooperatively and collaboratively with other Federal agencies, states, tribes, local stakeholders, and non-governmental organizations on fire and fuels management, habitat restoration, along with post-fire stabilization, rehabilitation, and restoration activities. The Southern Utah Resilient Landscape Collaborative exemplifies the ability to leverage funds as the $2.6 million in Resilient Landscape funds were doubled to $5.2 million from other Bureau and collaborative funds including $1 million in contributed funds.


Telemetry data showing Sage-Grouse traveling into Pinyon-Juniper treatments
Google
Goo

- **Integration within the Utah BLM between the Fire and Fuels Program and the Division of Natural Resources** with Wildlife, Healthy Lands, Range, and Planning has been occurring at all levels throughout the state. A Wildlife and Fuels Leads meeting occurred prior to the Sagebrush Ecosystem Conservation: All Hands, All Lands Conference. The Utah BLM Prescribed Fire & Fuels Workshop held in conjunction with the Restoring the West Conference included topics of Sage-Grouse Resource Management Plan Amendments and Collaboration with NRCS.

While Utah supports 5-8% of the total range-wide population of Greater Sage-Grouse, opportunities exist to not only conserve existing habitat, but also expand upon such habitat. Utah BLM has and will continue to play a significant role in providing for the conservation, maintenance, and restoration of Sage-Grouse habitat as demonstrated through the acres treated and dollars invested, representing a fraction of the positive work occurring within the BLM and across Utah. The Utah BLM Fire and Fuels Management Program, working in conjunction with Resources, and the UPCD partnership is positioned to continue such work and contribute towards positive outcomes for the Sage-Grouse.

Utah Bureau of Land Management
Fuels Program Assessment
Winter 2017

What strengths does your program bring to the State of Utah?

Color Country

- Color Country brings the largest geographic area of resilient landscape opportunity in Utah with multiple (111) communities at risk from wildfire.
- The district's fuels program organization structure is designed to optimize opportunities to the largest extent possible with current staffing.
- Current partnerships are heavily emphasized and the district is consistently striving to create new relationships.
- Color Country markets the district fuels program to the best of their ability, even without having adequate tools to perform this invaluable program element.
- The district fuels program has gained large national support and district leadership is strong, contributing to program strengths.

Canyon Country

- The Canyon Country Fire Zone (CYFZ) Fuels Program is responsible for restoration and hazardous fuels treatments on approximately 6.2 million acres of BLM administered lands in southeastern Utah.
- The zone encompasses three BLM Field Offices (Price, Moab and Monticello) and four Counties (Carbon, Emery, Grand and San Juan).
- The CYFZ fuels program has excellent collaborative partnerships with the State of Utah, USFS, NPS, BIA, CO-BLM, CO University and local non-Profits.
- The CYFZ Fuels Program has taken a lead role to integrate the new AIM strategy for application into Fuels monitoring.
- The CYFZ contains various opportunities for fuels treatments along 4 major river systems and in diverse habitats including; Ponderosa pine stands, Aspen, PJ, sagebrush, Gunnison and Sage-grouse.

Green River

- We have a great relationship with the NE Utah DWR and work collaboratively with them on treatments where we can.
- Ability to manage fires for resource benefit.
- Fuels and wildlife staff are integrated and working collaboratively.
- GRD support of other Fuels programs within the state.
- Currently planning and implementing landscape level burns.
- Fuels staff supports District Preparedness Program.
- Our small Fuels staff is required to be proficient in areas such as GIS that other Programs have a funded position for.
- Our program has accepted Brad Washa into the circle of trust! (subject to change)

West Desert District

- WDD contains 4 GRSG PACs (Box Elder, Rich, Ibapah, Sheeprock.)
- Have strong working relationship/collaboration with State agencies, and WRI
- Fuels team is very active in Utah WRI at state and regional levels.

- District has completed multiple landscape level projects over past 5-10 years for both hazardous fuels and habitat objectives.
- Mitigation Education and Trespass team have been involved in several state and national level projects.
- The WDD Trespass program has collected $500,000 in past 2 years for, $450,000 BLM dollars. Investigated 60 fires in past 2 years.
- Mit-Ed reaches over 100,000 per year with all events. Is responsible for providing education to Wasatch Front Communities, and 8 rural counties surrounding the front.

What weaknesses does your program have where you could use assistance from others in the State of Utah?

Color Country

- The ability to market program success is limited. Tools and technology are needed to accomplish district goals for program marketing.
- More emphasis and support, while working closely with public affairs to enable district employees would be greatly appreciated at the State Office.

Canyon Country

- Increasing administrative workloads, reduced and untimely budgets;
- Keep providing push back to the National Office when they continue to overcomplicate the system by creating more systems, procedures and exercises that tie up our limited time and resources.
- Continue to work for Utah's Fuels Budget.

Green River

- Our small organization hurts our ability to accomplish more acres.

West Desert District

- We have had limited opportunity to work on WUI projects, Community Assistance projects.
- Project work has transitioned from 3 months (Sep.-Nov.) to 8 months (Sep. - April). Workload on primary implementation staff is demanding with no down time between fire season, fuels implementation season, and back to fire season. Could use help implementing and coordinating contracts and fall fieldwork during busy periods.
- BLM contracting could be improved for fuels contracts, maybe over-relying on Utah WRI
- Fully integrating Fillmore FO into WDD even in simple things like NFPORs and other administrative venues.

How would you consider your relationship with the Utah State Office Fuels Program?

- Relations with the State Office are good for fuels and Mit/Ed functions. Effective communication currently exists.
- The CYFZ has developed a solid communication and working relationship with the State

Fuels Lead.

- Our relationship with the BLM State fuels lead is very good (see above statement about circle of trust).
- WDD has a good relationship with Utah SO Fuels program.
- Lots of patience over the last year and ability to work with several new employees and getting them integrated in state level oversight and management as needed.
- Great coordination with monthly calls and annual or semiannual meetings.

How could this relationship be improved?

- The district needs the State Office to more positively influence Public Affairs to set more of a priority on fuels program marketing and educate new staff members on current and future program needs to effectively communicate internally and externally.
- Free beer
- Don't know!
- More assistance with getting messaging out about successes as a state or region to media or national outlets.
- More direct involvement with state level Fuels Committee, to balance influence of other agencies.

How do you feel about the responsiveness of the Utah State Office to questions and issues from the field?

- During "summer months" it appears like some State Office functions might forget what priorities exist for district personnel, creating unrealistic time frames for data requests. Responsiveness varies when everyone gets busy but mostly remains positive.
- Most questions are answered immediately with a phone call or within the day by email.
- They have been responsive for the most part.
- Overall responsiveness is really good / excellent.
- Clearer communications on NFPORs data calls and POW expectations.

Do you feel there is transparency in decisions regarding the Fuels Program made within Utah BLM?

- Transparency has always been strength of Utah BLM for Mit/Ed and Fuels programs.
- It's transparent that there is transparency.
- We believe that there is adequate transparency with the fuels organization in Utah. Brad, as a state lead spends considerable time sending budget and tracking information to the fire organization as a whole. If you look at the email lists, everyone from fuels technicians to FMO's are on the list as well as almost the entirety of the State Office. Essentially, people can take as much or as little out of the fuels organization as they would like to. There is an abundance of opportunity to participate in monthly fuels conference calls, bi-annual workshops, and pre, and post season fire meetings. In our experience, FMO's have

not shown a great deal of interest in the fuels organization except from a funding perspective. This may not be the case for all districts.

- Transparency in the program is good.
- Decisions are made considering needs of every district program, very democratic.

If you feel there needs to be a greater level of transparency, how can this be achieved?

- Transparency is good. Provide fuels work months spreadsheet to FLT for all fuels dollars funding in the state.
- Communication and education can always be improved.
- When does transparency turn to invisibility creating the illusion of relevance but in reality retreats into the useless void of insignificance?
- We do not feel that there needs to be a greater level of transparency. If anything, the amount of data coming out of the state office needs to be condensed into perhaps a smaller number of spreadsheets. NIFC is working to streamline reporting; but as it stands now, there are too many portals for input all asking the same questions.
- Transparency is good. Provide fuels work months spreadsheet to FLT for all fuels dollars funding in the state.
- Provide pre-list for mid-year funding changes. For example, have a state list of top 10 projects that are priority for funded if mid-year dollars come from NIFC.

Outside of the State Fuels Program Lead, what can the Utah State Office do to help make your program a success.

- Make program marking a priority and work to effectively change the current Public Affairs challenges.
- Develop and allow new tools to be used to highlight program success internally and externally.
- In recent hiring effort, fuels positions seem to have been given less priority then preparedness positions. This has continued and no fuels position has been advertised while preparedness positions keep getting rolled to the top even after sometimes being advertised multiple times.
- Get to know us and our program as Brad has done.
- Explore funding sources outside of sage grouse and support riparian restoration efforts along southeast Utah's four major river systems.
- There appears to be one or two people in the State Office that look at the fuels program as a lesser element of the overall Fire Management program.
- I think in general the state office can do a better job of bridging the gap between fuels and suppression organizations. At a local level, we are asked to work together and collaborate as an organization. In Vernal, our success depends upon it. In the State Office, we do not see the same level of collaboration occurring.

- At times a more confrontational approach is taken by some in the State Office vs. wanting to support the field. There seems to be the creations of a divide or some kind of hidden agenda and lack of support or recognition of the fuels program.
- Engagement with the field at the same level as Brad W. would be a benefit to the entire state.
- More assistance with contracting and administrative function, including responsiveness and problem solving.
- It would be helpful if positions are being added to the T.O. the field is consulted and existing needs are prioritized over seemingly reactive wants.
- State aviation can provide more ground level support for fuels and fire program.
- Meaningful involvement and assistance in air attack program to meet national standards. I.E. update PDs, CRM for aircraft dispatch.

What type of information does the Utah State Office provide that is useful to your program?

- Regular coordination through emails and conference calls are useful to ensure we are all on the same page and coordinating internal efforts.
- Local and national policy updates, changes and funding status.
- Nothing significant to contribute here.
- Regular coordination through emails and conference calls are useful to ensure we are all on the same page and coordinating internal efforts.
- Hiring and IMs and updates from the National office and State office.

What type of information does the Utah State Office provide that is of little use to your program?

- Occasionally there is implementation of local CA projects that have already been approved that the district level had no input on. After-the-fact information is frequently useless.
- Records management criteria.
- The information that comes from the state is useful in general. Refer to previous comments regarding the streamlining of information.
- Everything is priority to someone.

What are your feelings on the integration with Resources along with efforts towards Sage-Grouse?

- Funding initiatives have changes focus areas for fuels and greater efforts toward public education is needed.
- Collaboration with other resources garners productive holistic fuels restoration products.
- In Vernal, we feel that we are extremely successful in this area.
- So far this has been a benefit to the WDD. However the tide could change and we are planning on being able to work in non GRSG areas when needed.

Utah Bureau of Land Management
Fuels Program Assessment
Winter 2017

• Concerned that if GRSG funding continues fire management priorities take more of a back seat to habitat needs, and the field offices are steering the fuels ship more than the FMOs.

Identify three positive things about Utah BLM's fuels program.
1. Utah is extremely proactive and leading the way nationally to resilient landscape restoration. 2. Utah's fuels program has strong leadership. 3. Utah focuses on large, interagency projects that encourage partnerships that are built to last.
1. Strong collaboration with WRI 2. Integrated monitoring and research collaboration with JFS and Universities 3. Support for local and National fire suppression efforts
1. Our level of accomplishment is almost staggering. 2. The WRI collaboration is fantastic and should be a model for other states to accomplish projects 3. I think as an entire state organization, we have very good people and great relationships.
1. Very proactive and effective in large landscape level projects. 2. Diverse workforce, with excellent skill set in each district. 3. Tight knit group that supports each other across the state.

Identify three things that could be done to improve Utah BLM's fuels program.
1. Make program marketing a priority. 2. Approve tools and software to market the fuels program. 3. Allow and trust district employees to engage in public affairs related activities.
1. Integration with other district offices around the state 2. More flexibility to use project/directed funds to pay for positons when base funding falls short
1. Funding of base positions 2. Funding of base positions 3. Funding of base positions
1. Higher base funding 2. More district level integration over fire management zones. 3. More emails from Brad Washa

Identify positive aspects about Utah's Smoke Management program.
• Dan is very helpful • It works! • New smoke management system is very good!

Utah Bureau of Land Management
Fuels Program Assessment
Winter 2017

- New website is helpful
- Dan Washington is invaluable

Identify improvements that could be made to Utah's Smoke Management program.

- Keep the Uintah Basin out of non-attainment
- Concern as to plan for position once Dan retires, if such retirement ever happens, as USFS Regional Office seems to have backed off on previous commitments and potential issues with hiring freeze and replacing Dan.
- Assure funding for Dan W exists if he retires.

Identify positive aspects about Utah BLM's Mitigation/Education program.

- Community assistance is an effective, proactive collaborative that works well with other agencies.
- Multiple partnerships and community relationships are strong and organized.
- Public meetings educate and communicate the agencies fuels program objectives effectively.
- The Mit/Ed positions in Utah have multiple collateral duties and remains flexible for priority work and can be utilized in many capacities; contract admin, PI work, etc.
- Good program marketing and education pieces are distributed without agency challenges and lack of tools.
- Education events are well received from the local public in large part by the Mit/Ed Program.
- State and local agencies are able to implement their programs through Mit/Ed relationships.
- Strong relationships with interagency partners;
- The program exhibits fortitude despite adversity;
- Unspoken network of self-reliance and support amongst District mit/ed's;
- Sense of value at District level.
- We have a great state message and ad campaign.

Identify improvements that could be made to Utah BLM's Mitigation/Education program.

- A sub-activity should be created to formally fund Mit/Ed.
- Mit/Ed needs tools, software, funding, and the approval to market the fuels program.
- Most Mit/Ed personnel in Utah have multiple collateral duties which create challenges to meet all district goals and objectives.
- Program seems to lack value and attention in overall statewide perspective of fire and fuels program.
- Need more representation and identity in NFPORS.

- Consistency in PD's/pay grades/staffing for District mit/ed positions (based on actual [unbiased] complexity rating, BLM human-caused fire occurrences, and workloads).
- Mit/Ed position needs more direction and interaction from the state lead.
- More proactive planning for events and needs.
- More involvement with the State of Utah and USFS and less reliance on WDD Mit-Ed Staff for coordination.

Identify positive aspects about Utah BLM's Fire Trespass program.

- Utah's Fire Trespass Program is leading the nation in terms of cost recovery and striving to investigate all human caused fires.
- Color Country District brings in on average $1.4 Million dollars annually.
- Very strong leadership and support from the State Office.
- Open lines of communication and sense of individual value to overall program.
- Our ability to recover costs has been a success for the state as a whole.
- Excellent involvement and work with districts on case development.
- Excellent work working with DOJ and DOI attorneys for fire billing and cost recovery.

Identify improvements that could be made to Utah BLM's Fire Trespass program.

- The Fire Trespass Program is turning into a full-time job and requires a lot of time for Mit/Ed personnel. This could honestly be a huge workload for one person that does fire trespass only if the agency was serious about administering this program the way it should be.
- More engagement and responsiveness from Solicitor.
- Policies need revised to reduce mandatory investigations of hopeless roadside fires which only serve to expose employees to additional unnecessary risk(s) and meaningless documentation processes.
- From our perspective the state program does not need improvement. Locally we are working on improving our efforts in this area.
- Development of program standards and district level program expectations.
- Development of qualified fire investigators at the state office to assist districts.

What is your greatest short term challenge for your fuels program?

- Tools, approval, and funding for program marketing.
- Too much time is wasted on administrate bureaucracy and useless required training which takes away from what needs to be accomplished on the ground.
- With increased funding and the associated acreage targets that come along with that; we do not have the ability to process NEPA at the level that is required.
- Getting large landscape NEPA documents signed.
- Achieving steady and predictable funding for Box Elder FIAT area.
- Hiring and developiong diverse, good (qualified), and reliable seasonal workforce.

Utah Bureau of Land Management
Fuels Program Assessment
Winter 2017

What is your greatest long term challenge for your fuels program?

- Mit/Ed has multiple collateral duties that continue to spread the larger fuels programs thin for these related duties.
- We have four major river systems which have severely degraded riparian zones do to invasive weeds and tamarisk. These river systems need more attention from the State Office and National Office to communicate the need, secure funding and divert resources.
- Our National priority changes too much within fuels. WUI one day, then GRSG, tomorrow something else! It's hard to run a program with a fluctuating budget!
- Integrating fuels and mit-ed Programs including duties and program expectations.
- Securing funding for key positions that are not guaranteed funding.
- Finding solutions to long-term effects of mastication through research and secondary implementation that is cost effective and safe.

With the budget fluctuations, what steps do you feel the Utah BLM Fuels Program needs to be taking to better position itself for the future.

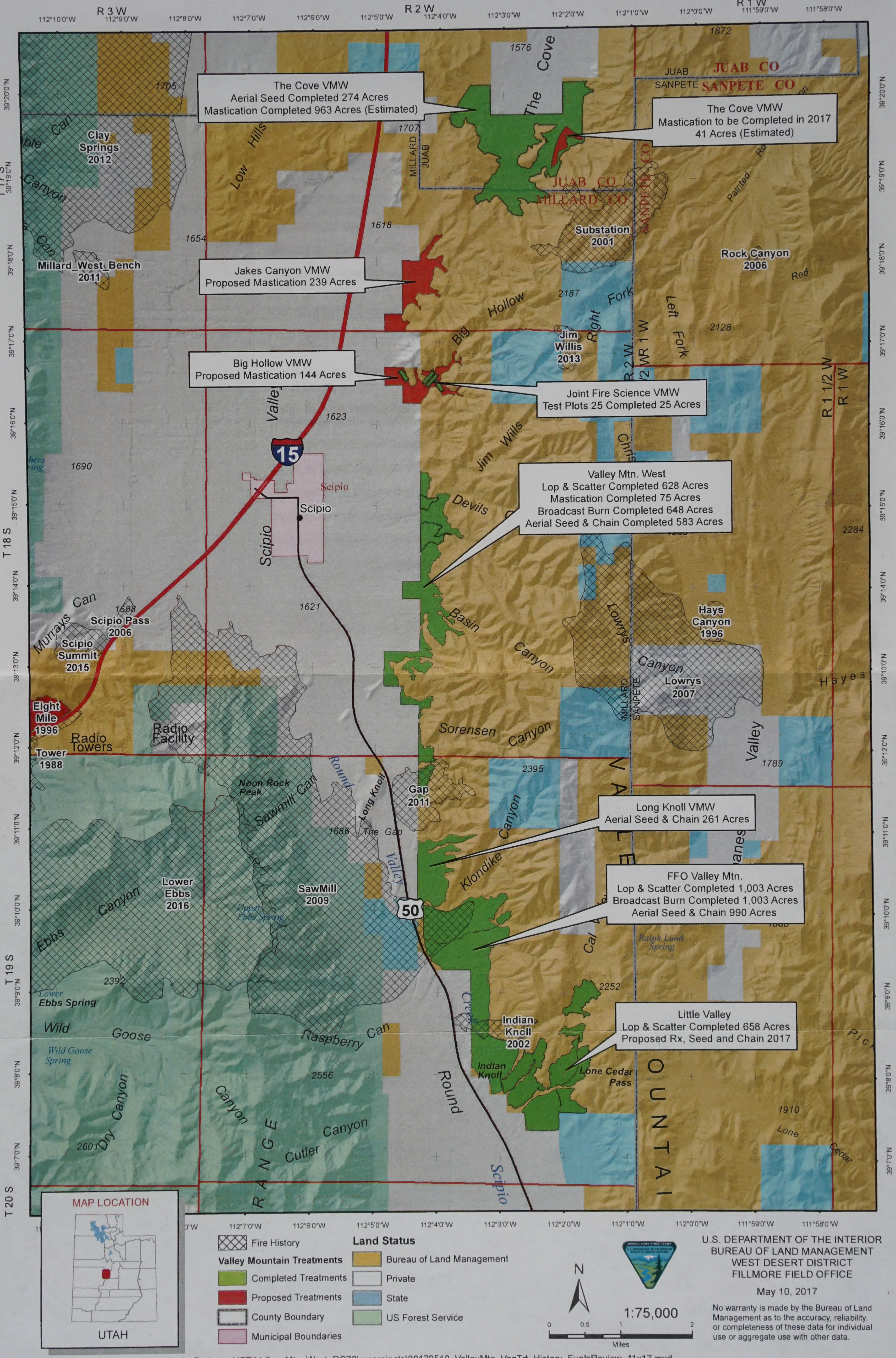
- We need to create new partners and tell our story to increase momentum for the future. There are many things we should start doing to educate and promote all of this good work.
- Continue to support and participate with WRI and other BLM resources
- Field Offices are always asked to explore outside funding sources in the event of a national fuels budget decline. Some of that pressure needs to be put on the State Office to explore alternative funding methods as well.
- Better integration with mit-ed and fire preparedness programs for funding and work-loads.
- Continued use of agreements and partnerships for project support.
- Work with national office to assure LF31 dollars stay LF31 and don't get turned into L110 so that if/when GRSG becomes less of a priority fuels dollars don't disappear with other funding streams.

Please provide any comments not addressed in the proceeding questions.

Revised: 8 February 2017
Updated: 13 April 2017

JBW

Fillmore Field Office Valley Mtn Vegetation Treatments



The Cove VMW
Aerial Seed Completed 274 Acres
Mastication Completed 963 Acres (Estimated)

The Cove VMW
Mastication to be Completed in 2017
41 Acres (Estimated)

Jakes Canyon VMW
Proposed Mastication 239 Acres

Big Hollow VMW
Proposed Mastication 144 Acres

Joint Fire Science VMW
Test Plots 25 Completed 25 Acres

Valley Mtn. West
Lop & Scatter Completed 628 Acres
Mastication Completed 75 Acres
Broadcast Burn Completed 648 Acres
Aerial Seed & Chain Completed 583 Acres

Long Knoll VMW
Aerial Seed & Chain 261 Acres

FFO Valley Mtn.
Lop & Scatter Completed 1,003 Acres
Broadcast Burn Completed 1,003 Acres
Aerial Seed & Chain 990 Acres

Little Valley
Lop & Scatter Completed 658 Acres
Proposed Rx, Seed and Chain 2017

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BUREAU OF LAND MANAGEMENT
WEST DESERT DISTRICT
FILLMORE FIELD OFFICE

May 10, 2017

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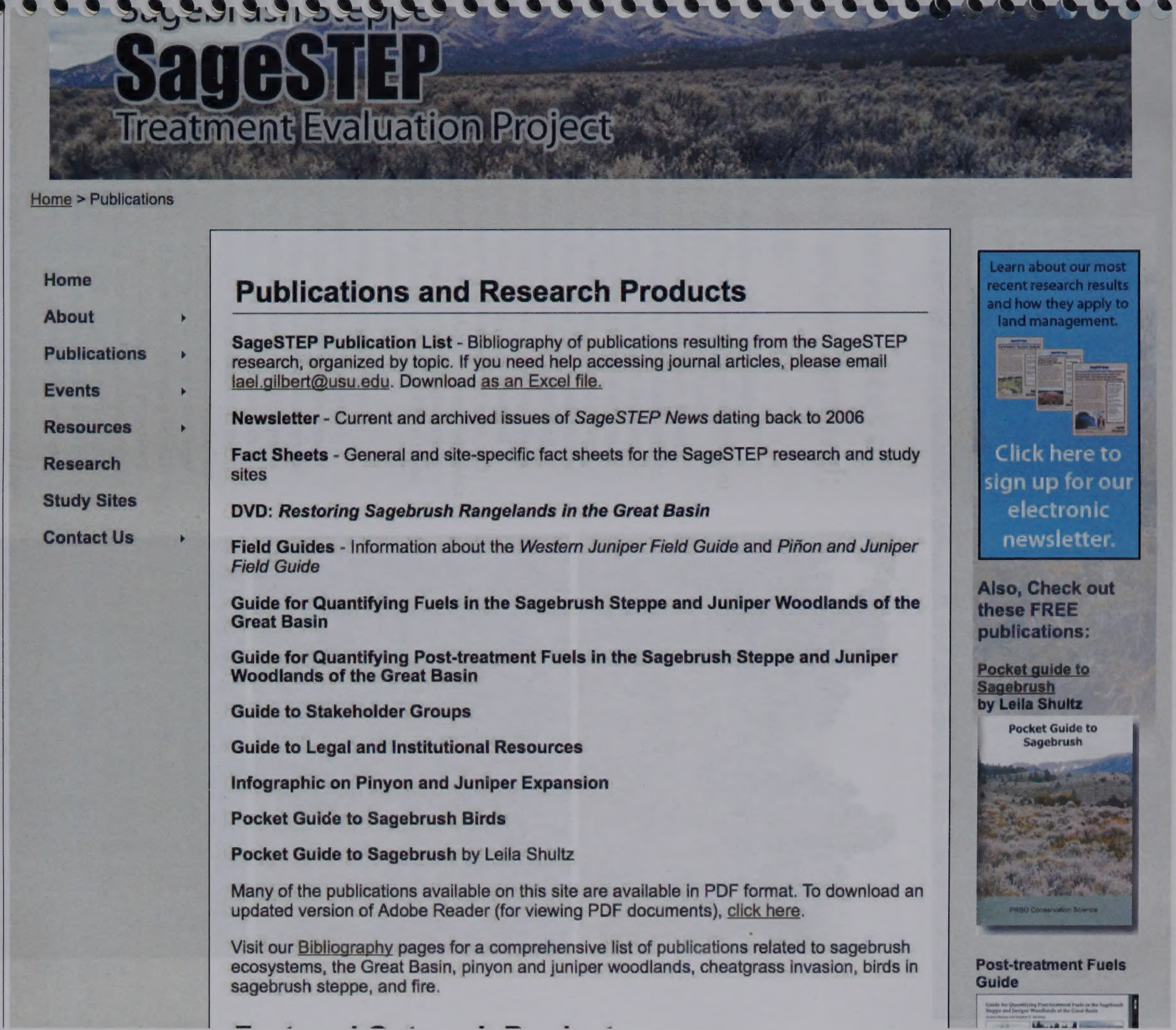

Sagebrush Steppe

SageSTEP

Treatment Evaluation Project

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Publications and Research Products

SageSTEP Publication List - Bibliography of publications resulting from the SageSTEP research, organized by topic. If you need help accessing journal articles, please email lael.gilbert@usu.edu. Download as an Excel file.

Newsletter - Current and archived issues of *SageSTEP News* dating back to 2006

Fact Sheets - General and site-specific fact sheets for the SageSTEP research and study sites

DVD: *Restoring Sagebrush Rangelands in the Great Basin*

Field Guides - Information about the *Western Juniper Field Guide* and *Piñon and Juniper Field Guide*

Guide for Quantifying Fuels in the Sagebrush Steppe and Juniper Woodlands of the Great Basin

Guide for Quantifying Post-treatment Fuels in the Sagebrush Steppe and Juniper Woodlands of the Great Basin

Guide to Stakeholder Groups

Guide to Legal and Institutional Resources

Infographic on Pinyon and Juniper Expansion

Pocket Guide to Sagebrush Birds

Pocket Guide to Sagebrush by Leila Shultz

Many of the publications available on this site are available in PDF format. To download an updated version of Adobe Reader (for viewing PDF documents), click here.

Visit our Bibliography pages for a comprehensive list of publications related to sagebrush ecosystems, the Great Basin, pinyon and juniper woodlands, cheatgrass invasion, birds in sagebrush steppe, and fire.

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by Leila Shultz

Post-treatment Fuels Guide

Sagebrush Steppe
SageSTEP
Treatment Evaluation Project

Issue 30, Spring 2017

Inside this Issue:

- Ecological consequences of tree removal after six years
- Developing technology to reduce seeding failure

Ecological Consequences of Pinyon and Juniper Removal; Six Years Later

The longer-term consequences of tree removal by prescribed fire or cutting (chainsaw cutting or mastication) is becoming easier to evaluate, thanks to recently published research by Rachel Williams, Bruce Roundy and others. This research details the fate of forbs, grasses, and shrubs (the understory) after treatments designed to address ongoing pinyon-juniper expansion at six years after treatment. The work then compares these patterns with those observed just three years after treatment. The ecological results after chainsaw cutting, or prescribed fire can appear similar in the short-term, but trajectories sometimes diverge over time. The authors measured understory vegetation cover and density at ten sites, and also included a gradient of before-treatment tree dominance (from virtually no trees to crowds of pinyon-juniper) to better understand how understory response differed under varying pre-treatment conditions.

Tree removal through cutting or prescribed fire is commonly used to restore structure and function to sagebrush communities. But how much trees dominate before treatment occurs plays a vital role in the eventual successional trajectory at these sites. Recovery depends on what species remained on site under PJ-encroached conditions, and on what type of disturbance occurred during treatment. At places with higher tree cover before treatment, both shrub and herbaceous cover took longer to recover … if shrub and herbaceous cover are already in decline at a site, treatments like cutting or prescribed fire and a lack of sprouting shrubs and seed sources make native recovery that much harder to achieve. Adding to that, a vacuum in native vegetation tend to be filled by invasive species, especially on warmer and drier sites.

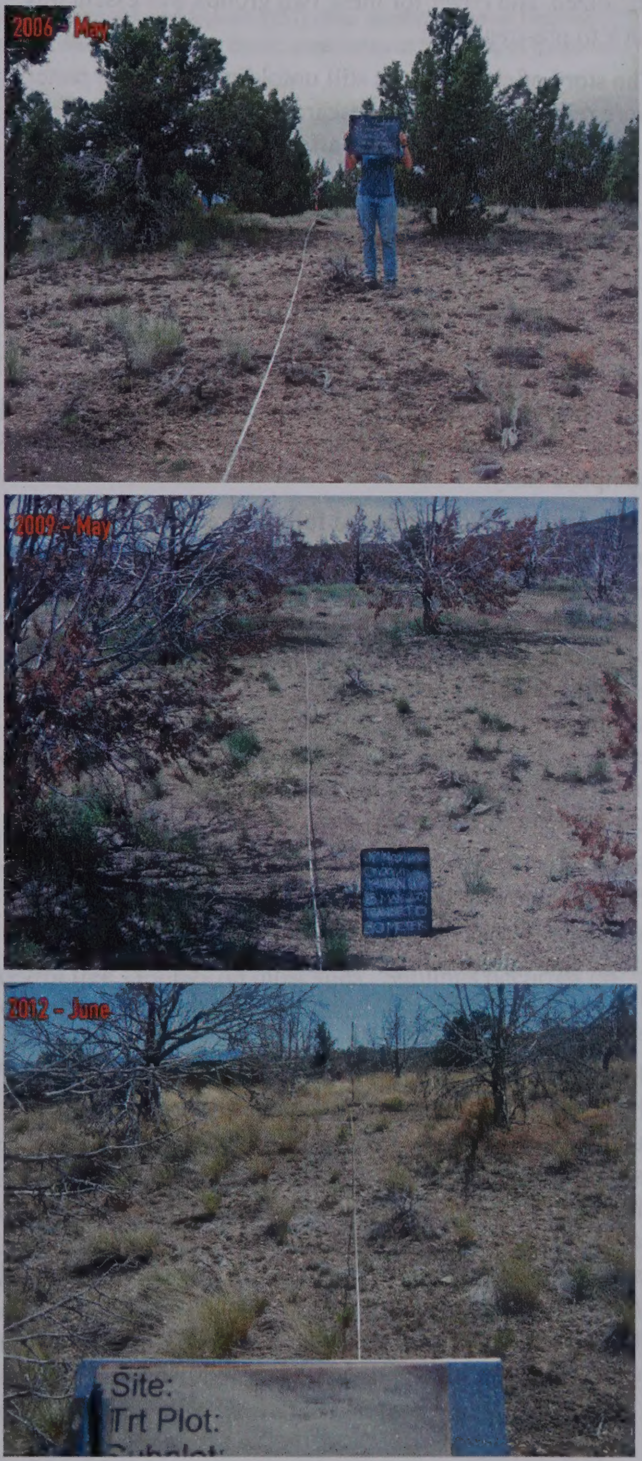

Photo Series 1. A series of photos of a prescribed fire-treated plot at Onaqui, Utah -- pretreatment in 2006, three years after the prescribed fire in 2009, and after six years in 2012.

Prescribed Fire Recovery

Different groups of vegetation respond to prescribed fire in different ways, and patterns have emerged more clearly over time. Prescribed fire initially increased annual and exotic forb cover, as they took advantage of released nutrients and additional moisture in the soil after the removal of trees. Increased cover of annual and exotic forbs was evident three years after treatment, especially at high pre-treatment tree density levels. But by year six, levels had stabilized, and cover for these two groups was essentially back to pre-treatment.

The story of cheatgrass is still unfolding, but some patterns were reinforced with this research. Cheatgrass likes disturbance, and does better after fire than it does after cutting treatments. Cheatgrass cover on burned plots had not yet settled at six years after treatment (Fig. 1), and additional monitoring is necessary to give managers a full grasp of the ultimate outcome at most sites. Over time, cheatgrass increased across all but the highest initial tree density plots. Typically, cheatgrass cover decreases as perennial grass cover increases with time after fire, but the ultimate story of cheatgrass dominance on these sites is still evolving, and future monitoring will be essential to see the complete story.

Tall grass cover continued to follow a recovery pathway over time, exceeding cover on untreated plots at six years after treatment, especially at sites with high pre-treatment tree densities (Fig. 2). Fire burned the aboveground portion of most tall grasses (Photo Series 1 and 2), and may have even damaged the roots, but it clearly wasn't enough to kill them. Although mechanical removal of trees appeared easier on tall grasses, we expect the burn results to look more like mechanical results at ten years out, if the current pattern continues.

Perennial forb cover increased at three years after both fire and cutting treatments, but trajectories converged at six years. While we expect some about-site and among-treatment variation in perennial forbs as time proceeds, it's likely that mean cover of this functional group has stabilized for the most part.

Fire is tough on sagebrush. Shrub cover and density that had been initially reduced by prescribed fire recovered under low to mid pre-treatment tree cover conditions at six years after treatment, mainly with sprouting shrubs, like rabbitbrush. But big sagebrush hadn't recovered even after six years (Fig. 3). The authors noted that sagebrush seedlings are starting to come back in, but they vary greatly from one site to another and have generally decreased from 3 to 6 years since treatment. Recovery of sagebrush canopies could take 15 to 50+ years following fire.

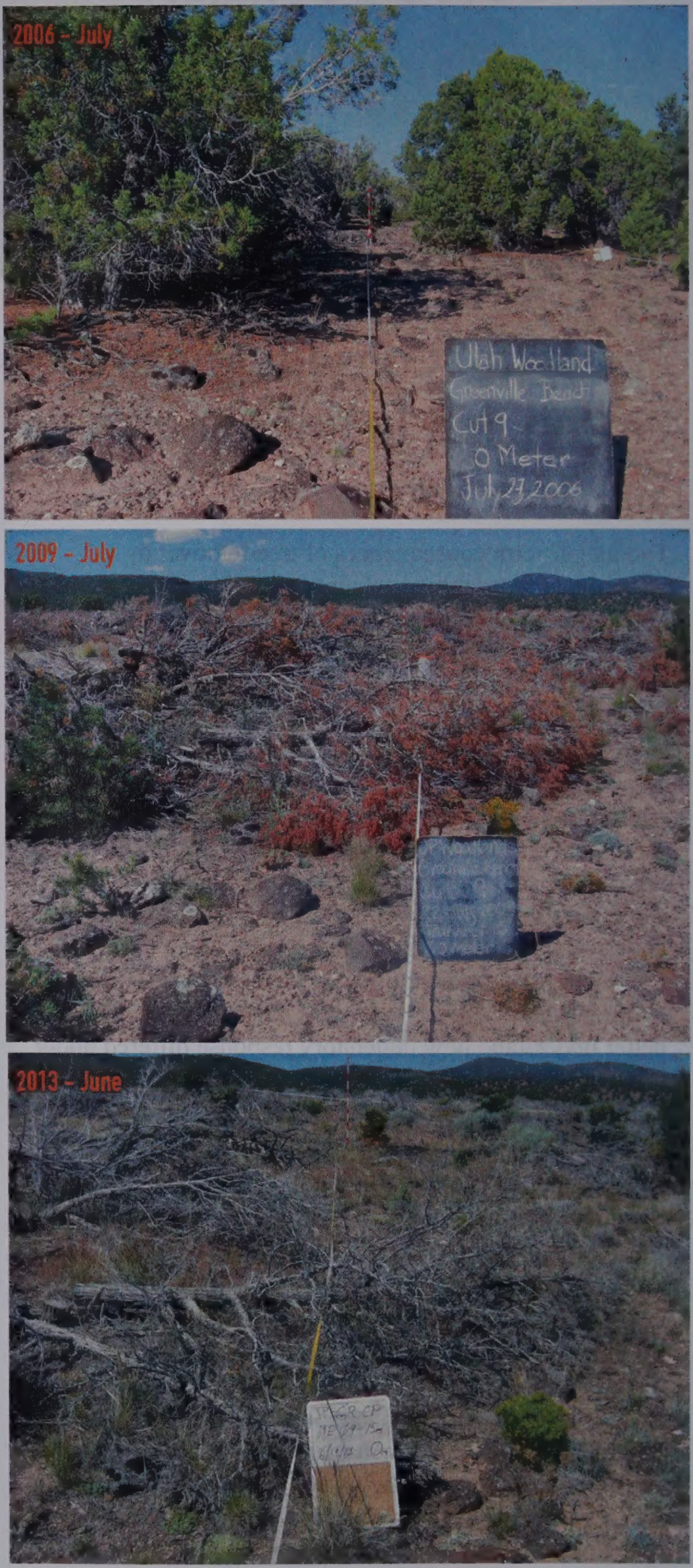

Photo Series 2. A series of photos of a mechanically-treated plot at Greenville Bench, Utah -- pretreatment in 2006, three years after cutting in 2009, and just after the six year mark in 2013.

Mechanical Treatment Recovery

Cutting benefited perennial forbs and shrubs, measured at both three and six years. A major advantage of mechanical tree reduction, compared to prescribed fire, is that it also maintains shrub cover. Cutting increased total shrub cover compared to untreated plots, especially at lower pre-treatment tree cover. Sagebrush cover and density paralleled shrub response, with roughly 10% increase in cover by six years at the lowest initial tree cover levels (Fig. 3). However, cutting should not be expected to rapidly recover sagebrush when initiated at mid to high pre-treatment tree dominance.

Cutting favored tall grasses compared to shrubs when implemented at higher pre-treatment tree cover, as tall grasses bounced back six years after mechanical treatment all along the initial tree density gradient. This indicates that tall grasses are not as sensitive to initial tree cover as are shrubs. As such, when trees were removed at mid to high pre-treatment tree dominance levels, tall grasses were in place to use the additional soil water made available after treatment. Tall grass density did not differ significantly on cut plots from three to six years, but the trend was positive.

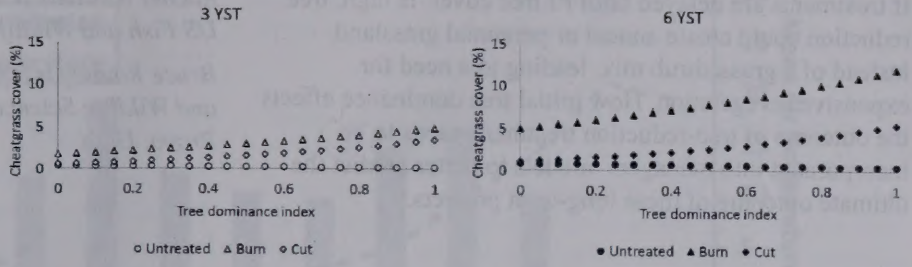

Figure 1. Vegetation cover of cheatgrass 3 and 6 years (YST) after conifer removal treatment in relation to treatment method and tree dominance index at the time of treatment.

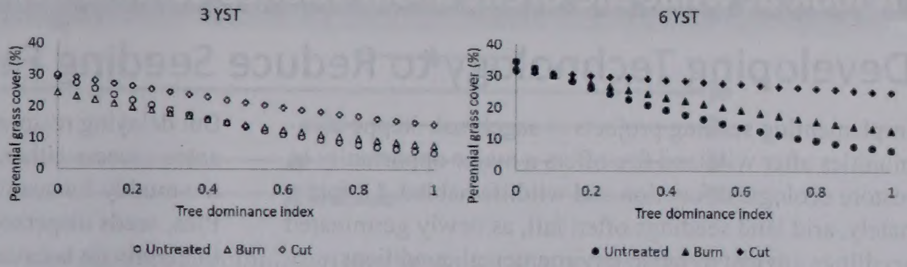

Figure 2. Vegetation cover of perennial grass at 3 and 6 years (YST) after conifer removal treatment in relation to treatment method and tree dominance index at the time of treatment.

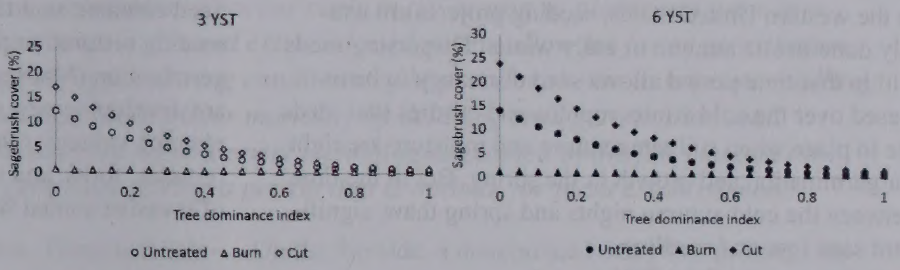

Figure 3. Vegetation cover of sagebrush 3 and 6 years (YST) after conifer removal treatment in relation to treatment method and tree dominance index at the time of treatment.

Prescribed Fire v. Cutting

Prescribed fire effectively controls trees and woody fuels, but it opens the door for cheatgrass invasion, and almost eliminates sagebrush cover. At six years post treatment, in areas with high initial tree dominance, cheatgrass levels increased under both treatments, but fire allowed cheatgrass to flourish more than cutting did. Perennial grasses especially did better at six years post-treatment under cutting than with fire (Fig. 2). Sagebrush at low initial tree dominance did best with cutting. Six years after a burn was not enough to record even partial recovery for sagebrush. Cutting, of course, puts all of the woody canopy fuels on the ground. Follow-up treatments may be required to control tree saplings on most sites. Saplings occurred on 50% of burned and 70% of cut subplots after six years.

Implications

To retain the shrub component on sagebrush sites and increase ecosystem resilience and resistance, the authors recommend mechanically reducing conifers at lower tree cover to best maintain perennial herbaceous cover and resist cheatgrass. But prescribed fire best controls trees and woody fuels, and can be effective for increasing perennial herbaceous cover on cooler and wetter sites where risk of cheatgrass is minimal. But fire should be avoided in areas where sagebrush is considered an important component, and on warmer sites where the risk for cheatgrass is high.

If treatments are delayed until PJ tree cover is high, tree reduction could create annual or perennial grassland instead of a grass/shrub mix, leading to a need for expensive revegetation. How initial tree dominance effects the outcome of tree-reduction treatment needs to be incorporated into managers' models to better predict the ultimate outcome of these long-term projects.

Rachel Williams is a Fish and Wildlife Biologist with the US Fish and Wildlife Service in Bishop, California.

Bruce Roundy is a professor in the Department of Plant and Wildlife Sciences at Brigham Young University in Provo, Utah.

Research Highlight

A look at what the Great Basin science community is studying:

Developing Technology to Reduce Seeding Failure

Implementing seeding projects in sagebrush steppe communities after wildland fire offers a major opportunity to restore ecological function and wildlife habitat. Unfortunately, arid land seedings often fail, as newly germinated seedlings are lost to harsh environmental conditions. To counter this, Matthew Madsen and Bruce Roundy at Brigham Young University are developing new technologies to improve seeding success on these complex and sometimes inhospitable landscapes.

In the western United States, seeding projects are usually done in late autumn or early winter. Dispersing seeds within that time period allows seed dormancy to be released over the cold winter months and ensures that seeds are in place when soil temperature and moisture are right for germination and growth in the spring. But in the time between the cold autumn nights and spring thaw, significant seed loss and seedling mortality occurs. Over 70% of grass seeds planted in autumn germinate prior to winter onset. Freezing may be a significant source of mortality to these young seedlings. In a recent analysis of soil temperature data from 14 SageSTEP sites, Roundy and Madsen (2016) found that sagebrush steppe surface soils had more than 60 freeze-thaw cycles between October and late March (Fig. 1). Seeds and seedlings may also experience mortality over the winter from predators or pathogens, drought, and expenditure of seed food resources (Fig. 2a).

But delaying restoration efforts until spring does not guarantee success either. The springtime soil is either frozen or too muddy for seeding equipment to muck its way through. Plus, seeds dispersed in the spring often don't have time to germinate because of short soil incubation periods, cool spring temperatures or dry conditions. And when germination does happen, seedlings may not have adequate root development to survive through the summer drought period (Fig. 2b).

Seed enhancement technologies may boost the success of seeding restoration projects by manipulating the timing of germination (Madsen et al. 2016). Madsen and Roundy are developing new seed enhancement technologies and planting strategies that would allow seeds of native plants (grasses, forbs, and shrubs) to mimic germination patterns of invasive annual weeds, and to germinate at times that

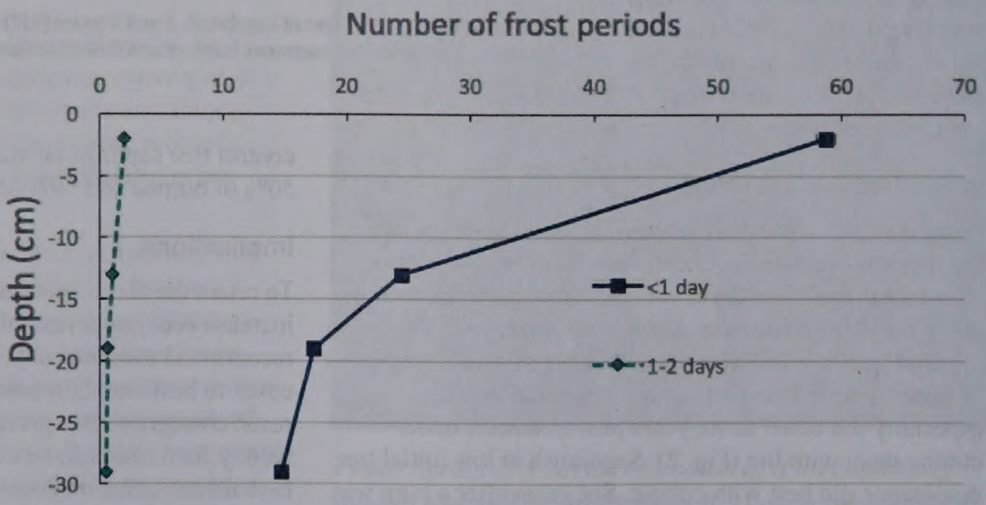

Figure 1. Most frost periods last less than one day, but that is enough to be a significant source of mortality to young seedlings.

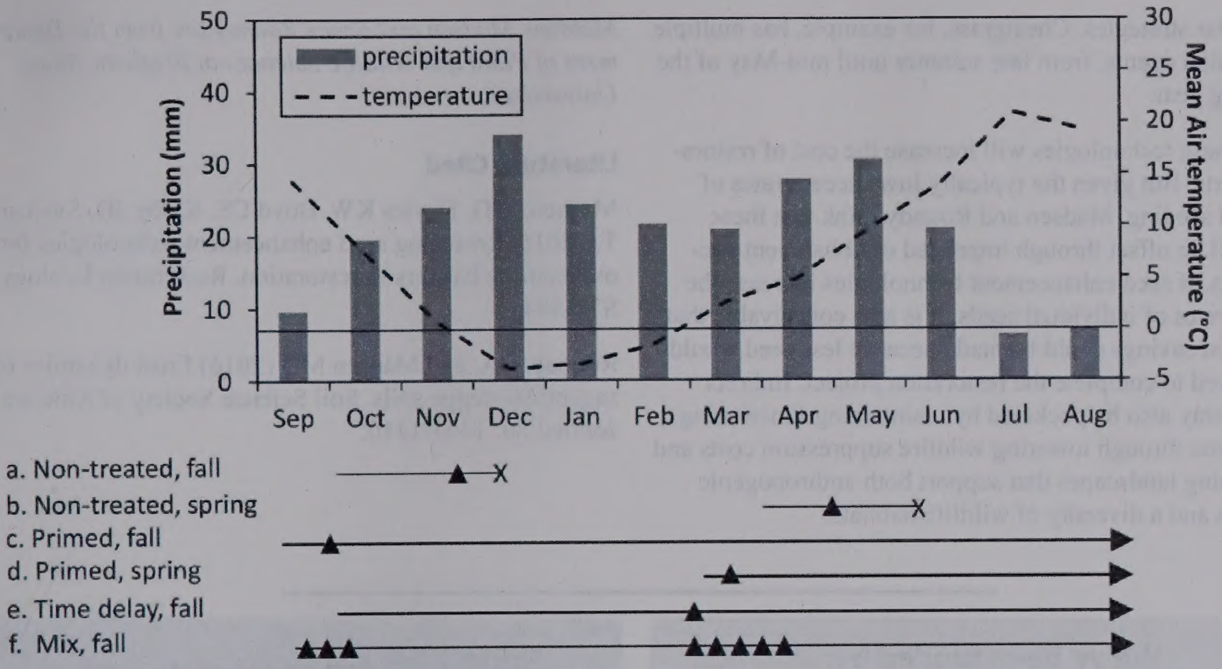

Figure 2. (Top) The long-term average monthly precipitation and mean air temperature near Rush Valley Utah. (Bottom) Possible seeding scenarios based on planting date and seeding technology. Start of the line = seeding date, "▲" = germination timing, "X" seedling mortality, "▶" seedling survival. a. Nontreated seed sown in fall germinate in winter and experience high mortality. b. Non-treated seed sown in the spring germinate just prior to summer and then desiccate due to lack of soil moisture. c. Primed extruded seed pellets allow germination to occur early in the season so plants can grow to a point they can survive through the winter. d. Primed extruded seed pellets allow for faster germination, which increases the time seedlings can grow during conditions of high soil moisture to improve seedling survival. e. Time-release seed coating avoids winter mortality by delaying seed germination until spring. f. Mix of non-treated seed and seed enhancement technologies planted in the fall increases the probability that some seeds will germinate during a period that is optimal for plant establishment.

are more favorable for plant establishment. These technologies either speed up or delay seed germination at predicable rates. They can be used together within the same seeding mix to expand the period that seed germination timing can occur and increase the probability that some seeds will germinate during periods that are best for plant establishment.

Seed Priming and Time Delay

For more rapid germination, seeds can be primed. Partially hydrating seeds allows the germination processes to begin. The primed seeds are incorporated into pellets that can be drilled or broadcast seeded. These seeds have a more rapid germination and emergence in autumn, which increases the period plants can grow and may make it more capable of surviving harsh freezing conditions later on (Fig. 2c). For spring plantings, priming may allow germination to occur early in the season and improve the probability that seminal roots of seedlings stay ahead of an advancing drying front and allow sufficient time for adventitious roots to develop before the extended drought period of summer (Fig. 2d).

On the flip side, a manipulated delay that prolongs the germination process could work advantageously for seeds sown in autumn – if it puts off seed germination until late winter or early spring. Madsen and Roundy are developing an approach to delay seed germination through the use of abscisic acid (ABA). Under laboratory conditions, their research is showing that the amount of ABA applied to the seed is correlated with the length of time it takes the seeds to germinate. Madsen hopes that in the field this technology will minimize seedling mortality over the winter while allowing seeds to capture early spring moisture resources (Fig. 2e).

Hedging the Bet

Without a crystal ball, it is impossible to know from one year to the next when the optimal time is for seed germination in arid and semi-arid regions. To hedge their bet, Madsen and Roundy are banking on strategies that minimize mortality by staggering the timing of seed germination through the population (Fig. 2f). Many invasive weeds use similar strategies. Cheatgrass, for example, has multiple germination events, from late summer until mid-May of the following year.

Use of these technologies will increase the cost of restoration efforts. But given the typically low success rates of arid land seeding, Madsen and Roundy think that these costs will be offset through improved establishment success rates. If seed enhancement technologies increase the success rates of individual seeds, it is also conceivable that direct cost savings could be made because less seed would be required to complete the restoration project. Indirect savings may also be pocketed by maintaining functioning ecosystems through lowering wildfire suppression costs and maintaining landscapes that support both anthropogenic activities and a diversity of wildlife habitats.

Matthew Madsen and Bruce Roundy are from the Department of Plant and Wildlife Sciences at Brigham Young University.

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Madsen, MD, Davies KW, Boyd CS, Kerby JD, Svejcar TJ (2016) Emerging seed enhancement technologies for overcoming barriers to restoration. Restoration Ecology 24: S77-S84.

Roundy, BA, and Madsen MD (2016) Frost dynamics of sagebrush steppe soils. Soil Science Society of America Journal 80: 1403-1410.

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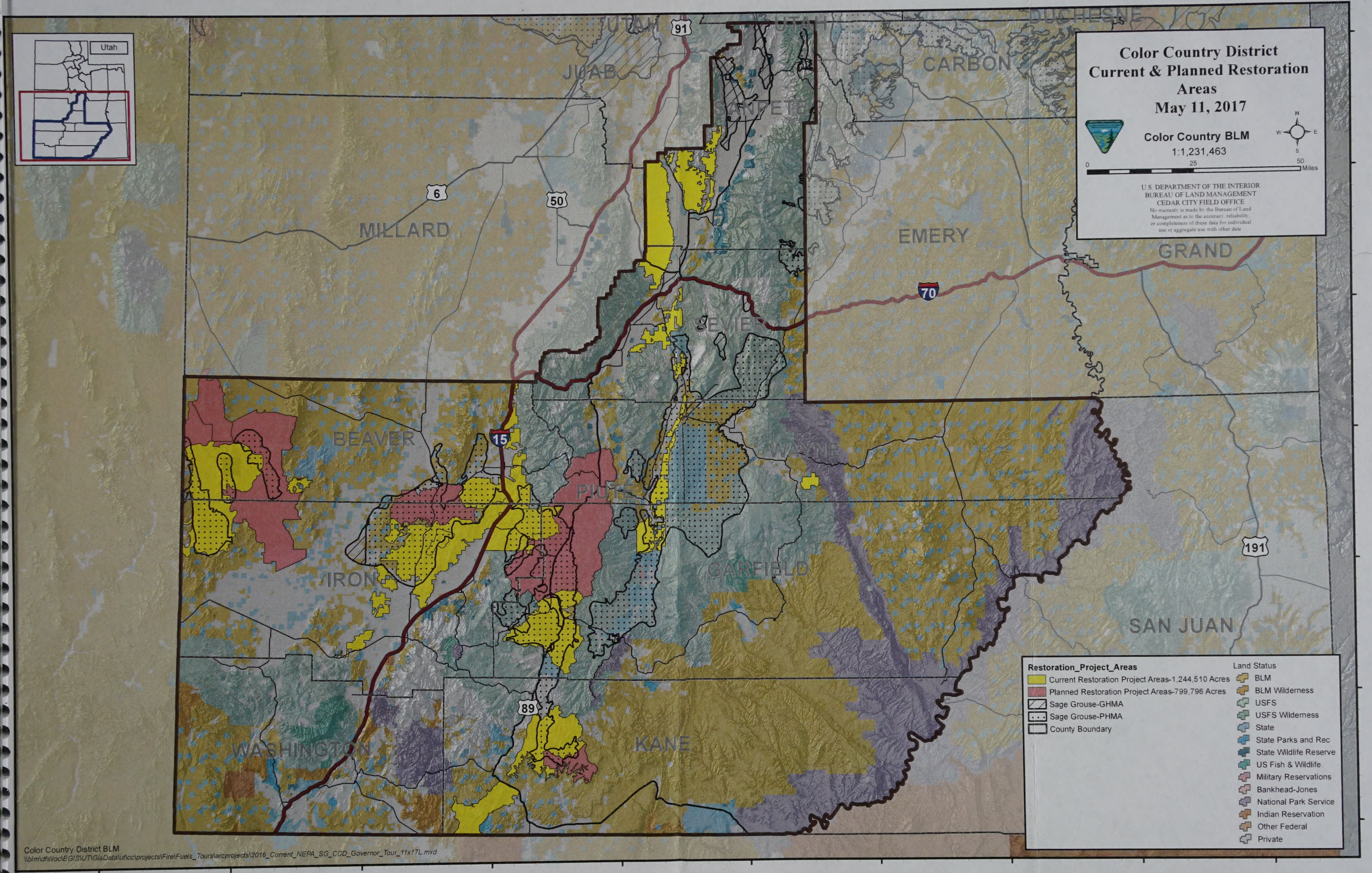
- Bureau of Land Management
- Bureau of Reclamation
- Joint Fire Science Program
- National Interagency Fire Center
- Oregon State University
- The Nature Conservancy
- University of Idaho
- University of Nevada, Reno
- US Geological Survey
- US Fish & Wildlife Service
- USDA Forest Service
- USDA Agricultural Research Service
- Utah State University



Color Country District Current & Planned Restoration Areas

May 11, 2017

Color Country BLM

1:1,231,463

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Restoration_Project_Areas

- 🟨 Current Restoration Project Areas-1,244,510 Acres
- 🟥 Planned Restoration Project Areas-799,796 Acres
- ▨ Sage Grouse-GHMA
- ☐ Sage Grouse-PHMA
- ☐ County Boundary

Land Status

- BLM
- BLM Wilderness
- USFS
- USFS Wilderness
- State
- State Parks and Rec
- State Wildlife Reserve
- US Fish & Wildlife
- Military Reservations
- Bankhead-Jones
- National Park Service
- Indian Reservation
- Other Federal
- Private

Color Country District BLM
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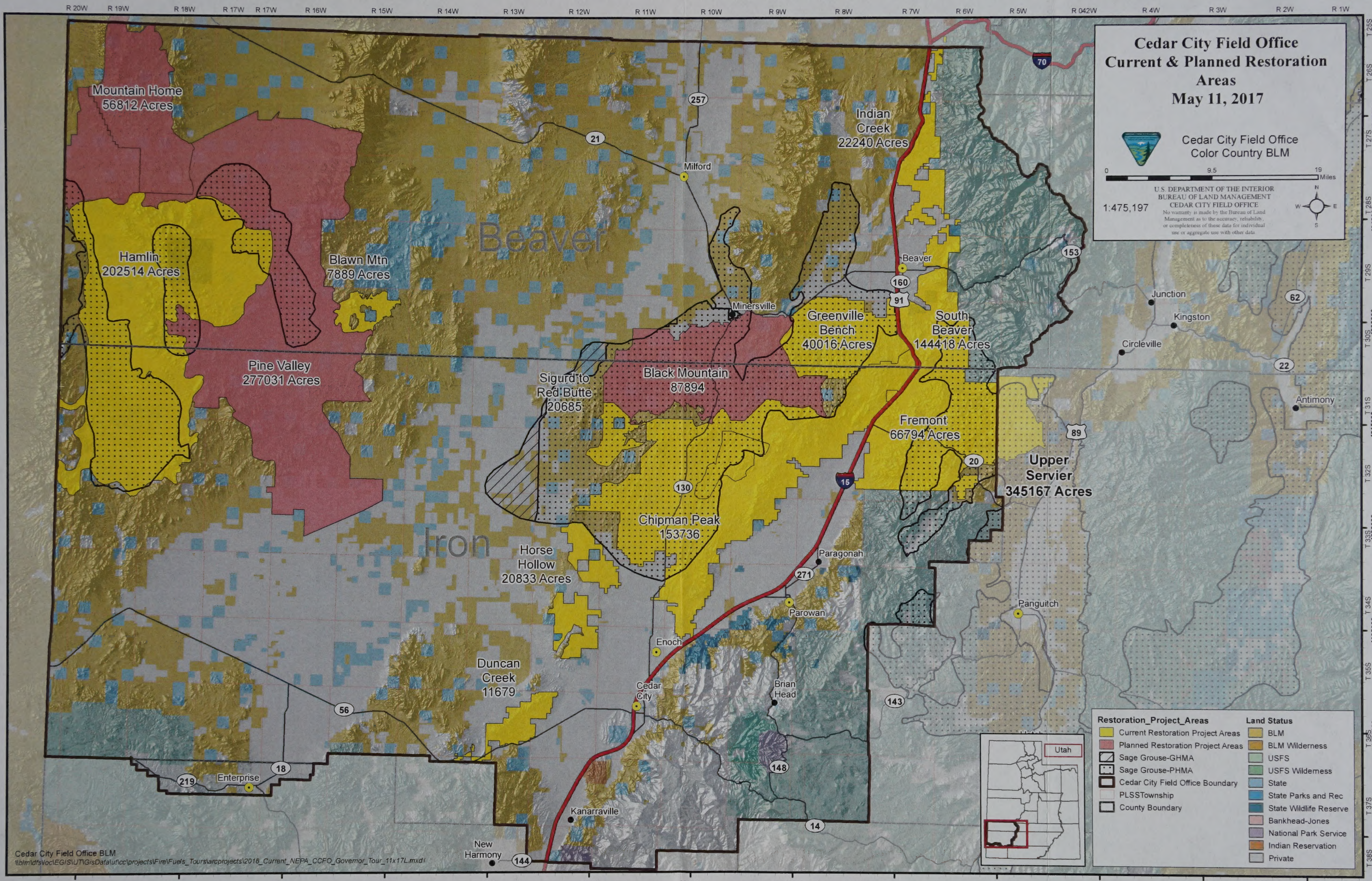

Cedar City Field Office Current & Planned Restoration Areas May 11, 2017

Cedar City Field Office
Color Country BLM

1:475,197

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Cedar City Field Office BLM
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Greenville Bench Vegetation Enhancement

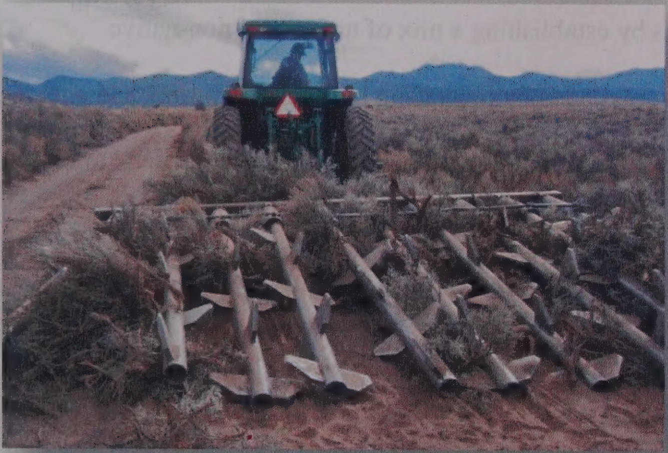
Introduction

The Greenville Bench and associated watershed consists of approx. 40,000 acres of publicly owned lands with scattered State owned sections in southeastern Beaver County, Utah. The dominant vegetation communities within the project area are big sagebrush on the lower benches and dense stands of pinyon/juniper on the upper slopes. The pinyon/juniper woodland has excluded the native understory, reducing benefits to wildlife and livestock, while also negatively impacting water quality and soil stability. The project was designed to treat approx. 20,000 acres within the watershed over a five year period accomplishing the following goals:

1. Decrease hazardous fuel loads within the project area, thereby protecting against the threat of catastrophic wildfires negatively impacting neighboring private lands and Interstate 15;
2. Re-establish sagebrush corridors between the Bald Hills and the Greenville Bench allowing for better dispersal and movement of wildlife;
3. Decrease the pinyon/juniper encroachment into areas once dominated by big sagebrush, forbs and grasses;
4. Increase plant diversity within the treatment areas by establishing a mix of native and non-native shrubs, forbs and grasses;
5. Improve the health of woodlands and sagebrush/grasslands by increasing biological diversity and age class;
6. Demonstrate the potential to utilize native species to restore decadent pinyon/juniper woodlands to sagebrush / perennial grass.

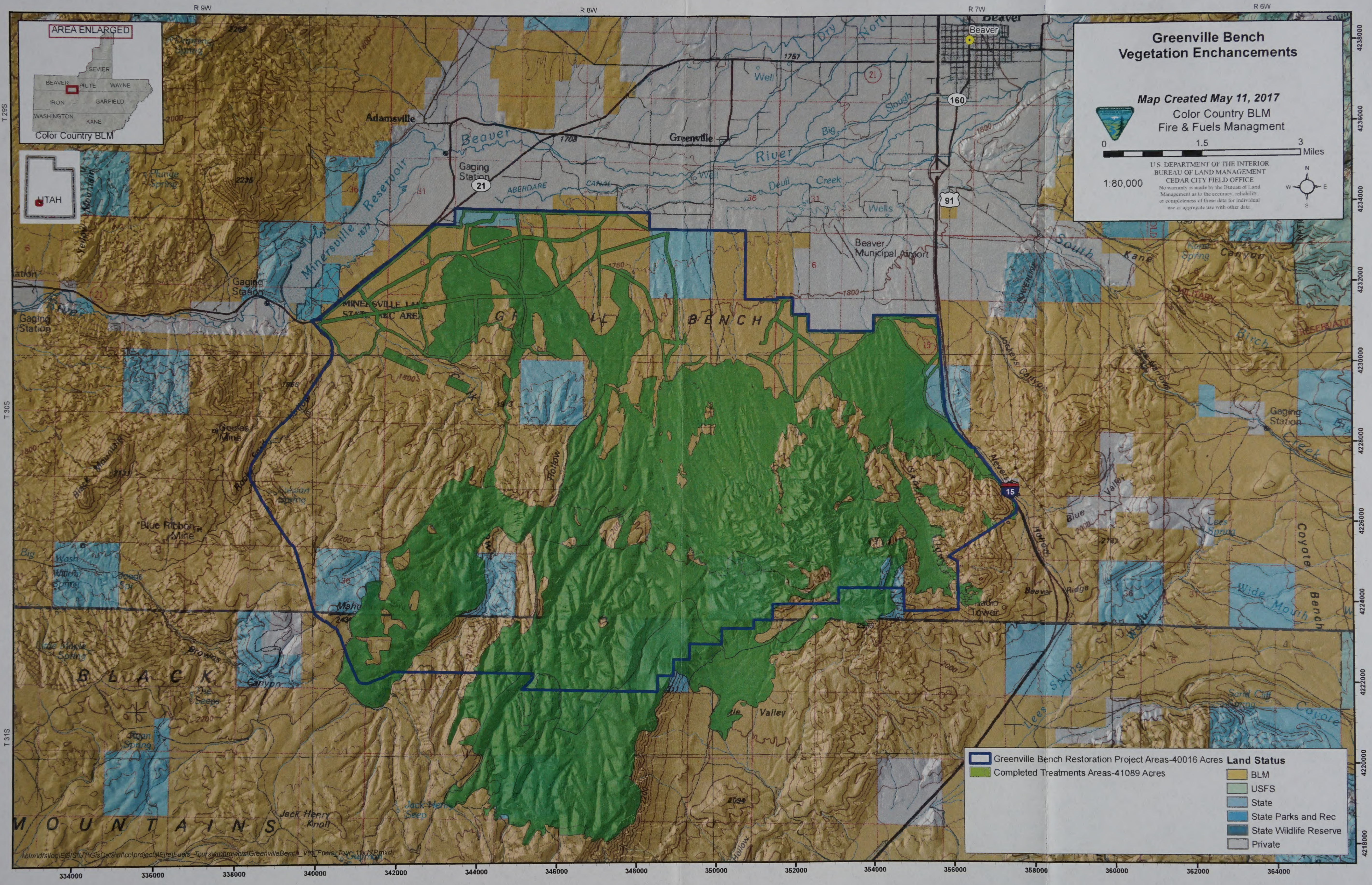
Greenville Bench Vegetation Enhancement

Treatment techniques utilized to accomplish the above mentioned goals have included hand thinning, bullhog, harrow, chaining, and prescribed burning.



Species	Lbs/acre
Crested Wheatgrass	2
Intermediate Wheatgrass	2
Snake River Wheatgrass	1
Indian Ricegrass	1
Small Burnet	2
Alfalfa	0.5
Fourwing Saltbush	1
Bitterbrush	0.5
Foreage Kochia	0.5
Total Lbs/acre	10.5

Treatment	Acres
Mastication/Bullhog	2,116
Chaining/Greenstrip	14,606
Hand Pile/Burn	51
Lop and Scatter	977
Harrow	2,440
Thinning	421
Broadcast/Burn	20,478
Total	**41,089**



Greenville Bench Vegetation Enchancements

Map Created May 11, 2017

Color Country BLM
Fire & Fuels Managment

0 1.5 3 Miles

1:80,000

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- ▭ Greenville Bench Restoration Project Areas-40016 Acres
- 🟩 Completed Treatments Areas-41089 Acres

Land Status

- ▨ BLM
- ▨ USFS
- ▨ State
- ▨ State Parks and Rec
- ▨ State Wildlife Reserve
- ▨ Private

Indian Creek Fuels Reduction Project

Introduction

The Indian Creek Fuels Reduction Project area consists of BLM administered lands east of I-15 from Beaver to I-70 and west of USFS Beaver Ranger District. This area is critical habitat for Mule Deer, Elk, and livestock. The area is now dominated by pinyon and juniper trees in areas once dominated by shrubs and herbaceous vegetation such as perennial grasses and forbs. This project has and will improve forage production and wildlife habitat. Overall, the Indian Creek NEPA project area will provide vegetation improvement opportunities on over 22,240 acres over the next several years.

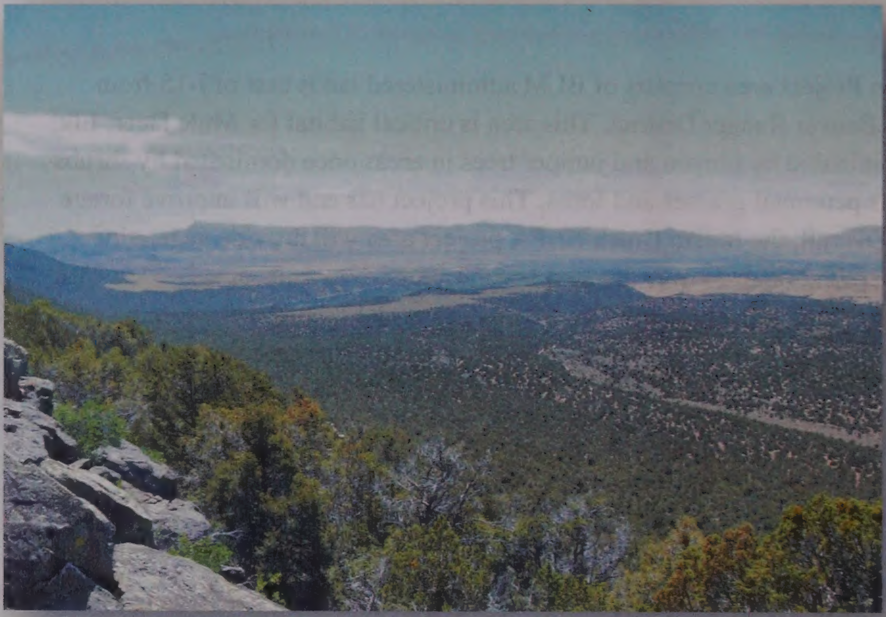
Objectives

- Maintain or improve vegetative diversity and age class structure for shrubs and forbs within the project area.
- Reintroduce healthy, viable, perennial grasses, forbs, and shrubs on historical sage and mountain brush sites.
- Decrease hazardous fuels by removing up to 95% of standing pinyon and juniper.
- Reduce pinyon and juniper density in areas where p/j has encroached into other habitat.
- Decrease upland erosion potential and reduce sedimentation into the Beaver River.

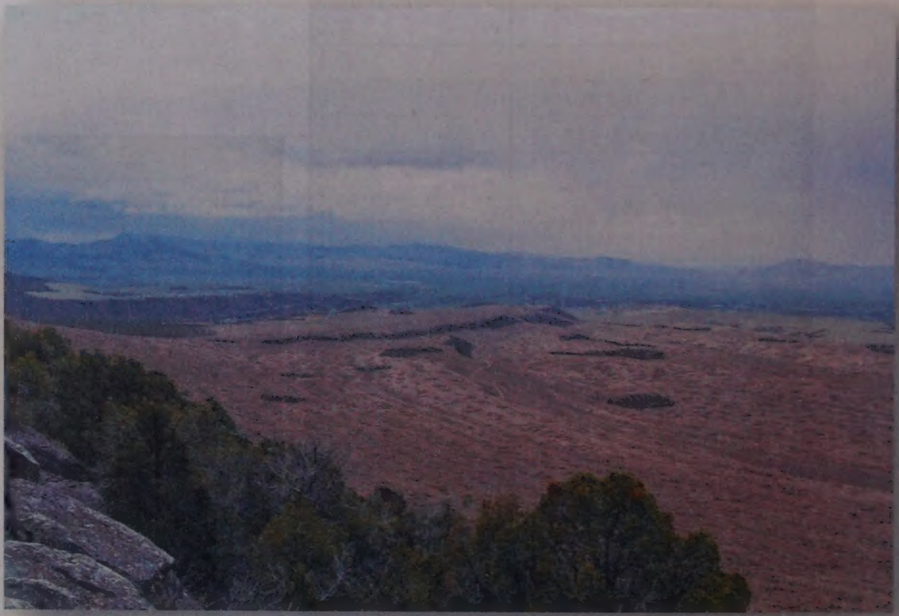
Sample Seed Mix

Species	Lbs/acre
Alfalfa	1.0
Bitterbrush	0.1
Snake River Wheatgrass	1.0
Crested Wheatgrass	0.5
Forage Kocia	0.4
Indian Ricegrass	2.1
Blue Flax	0.1
Prickly lettuce	0.1
Palmer Penstemon	0.0
Western Wheatgrass	0.8
small Burnet	2.0
Yellow Sweetclover	0.4
Fourwing Saltbush	0.3
Annual Sunflower	0.1
Stansbury Cliffrose	0.1
Russian Wildrye	1.0
Sanfoin	0.5
Lbs/acre	**10.49**

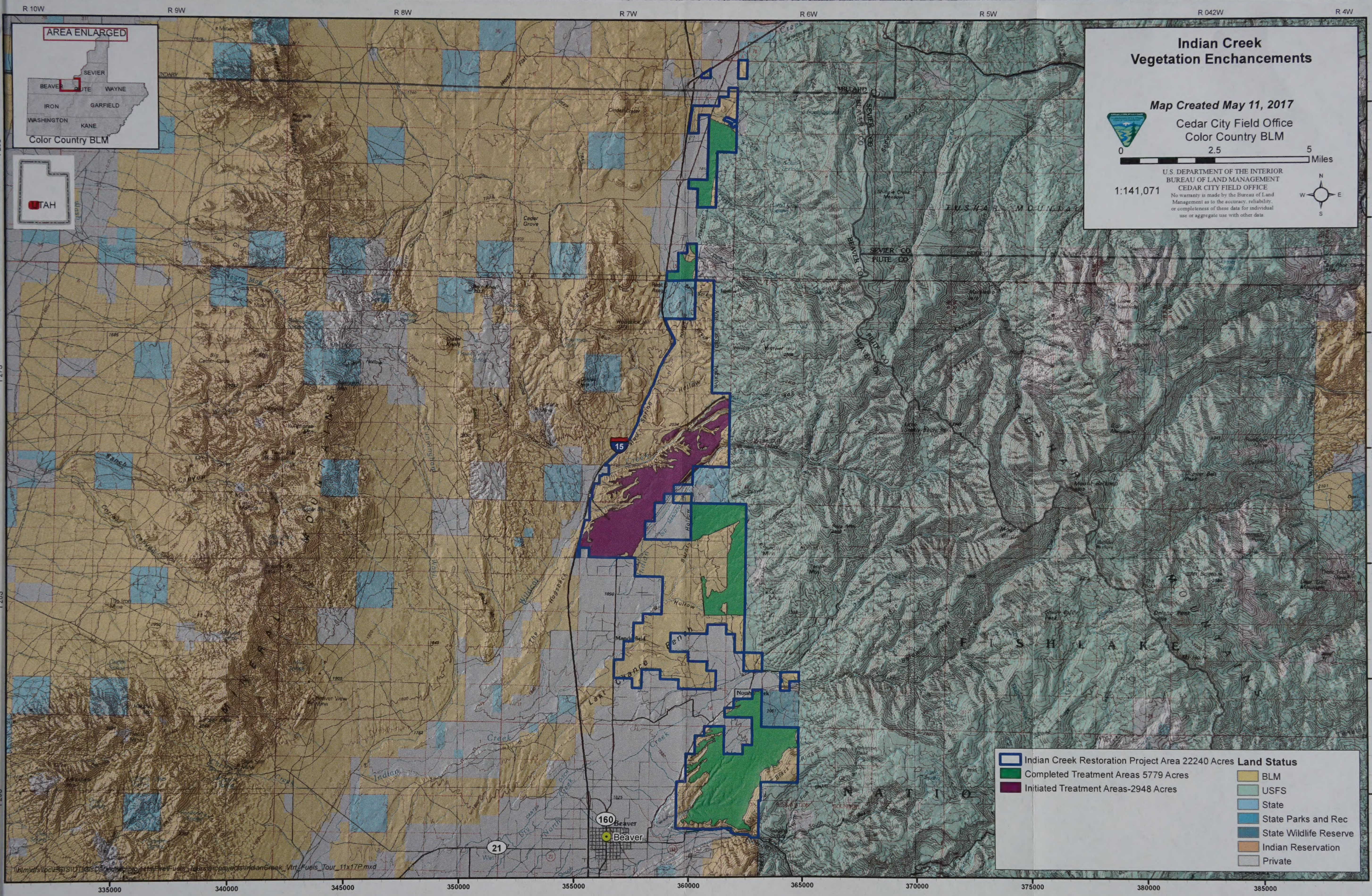
Treatment	Acres
Bullhog	356
Chaining	4,469
Lop and Scatter	1,600
Rx	5
Planned chaining (2017)	2,948
	9,378



Before Treatment (2014)



After Treatment (2015)


Indian Creek
Vegetation Enchancements
Map Created May 11, 2017
Cedar City Field Office
Color Country BLM
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2.5
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Miles
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BUREAU OF LAND MANAGEMENT
CEDAR CITY FIELD OFFICE
No warranty is made by the Bureau of Land Management as to the accuracy, reliability, or completeness of these data for individual use or aggregate use with other data
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W
AREA ENLARGED
SEVIER
BEAVER
PIUTE
WAYNE
IRON
GARFIELD
WASHINGTON
KANE
Color Country BLM
UTAH
Indian Creek Restoration Project Area 22240 Acres
Completed Treatment Areas 5779 Acres
Initiated Treatment Areas-2948 Acres
Land Status
BLM
USFS
State
State Parks and Rec
State Wildlife Reserve
Indian Reservation
Private
R 10W
R 9W
R 8W
R 7W
R 6W
R 5W
R 042W
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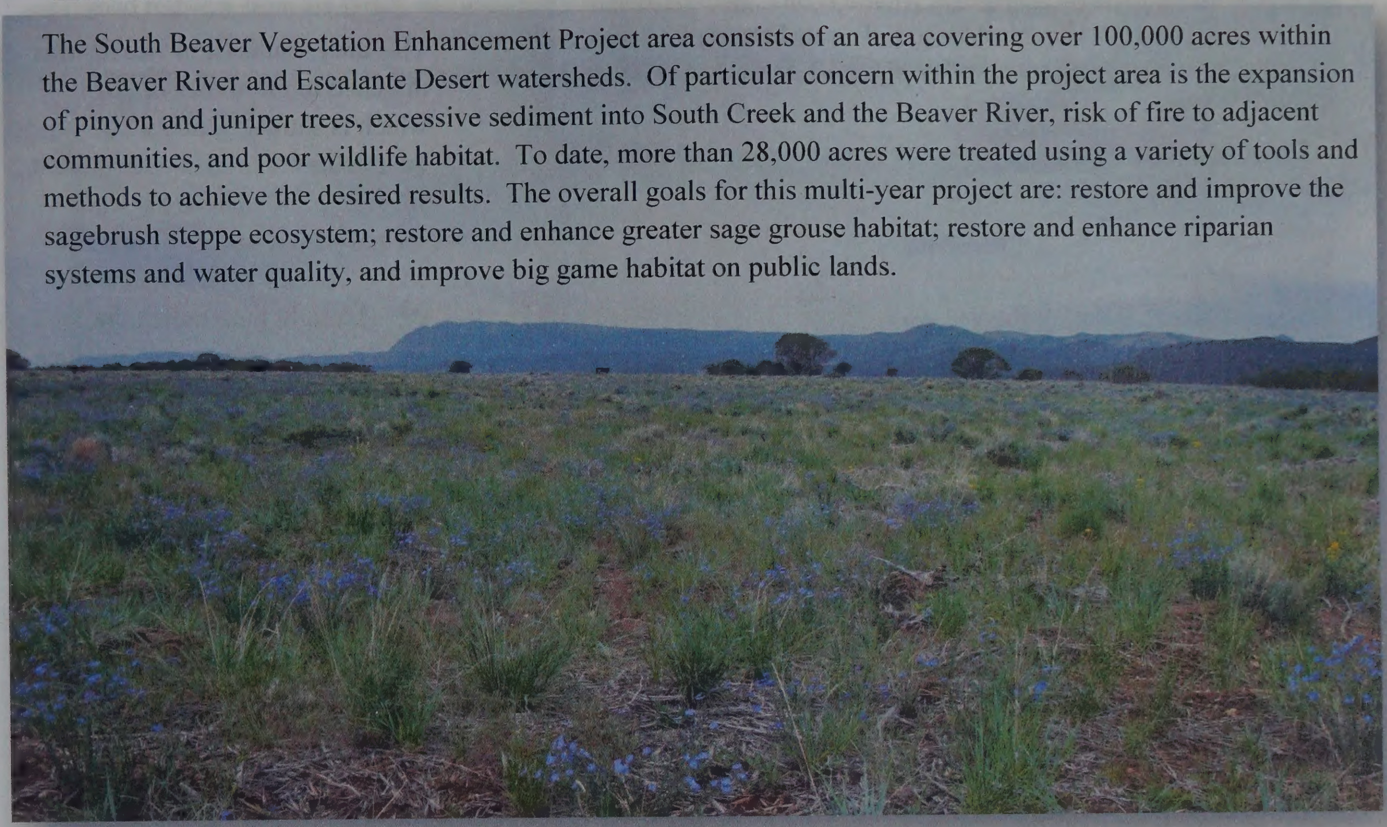
PIUTE CO
MILLARD CO
FISHLAKE
NATIO
Last Chance Bench

South Beaver Vegetation Enhancement

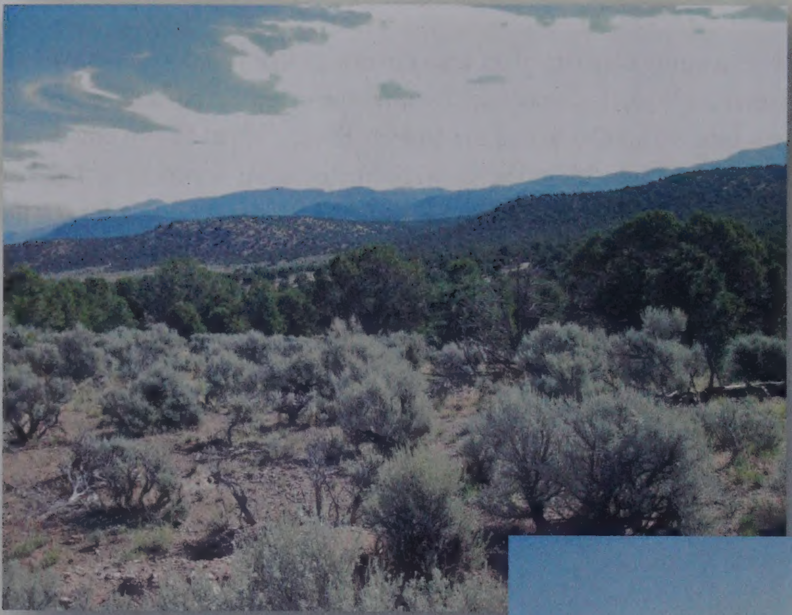
Introduction

The South Beaver Vegetation Enhancement Project area consists of an area covering over 100,000 acres within the Beaver River and Escalante Desert watersheds. Of particular concern within the project area is the expansion of pinyon and juniper trees, excessive sediment into South Creek and the Beaver River, risk of fire to adjacent communities, and poor wildlife habitat. To date, more than 28,000 acres were treated using a variety of tools and methods to achieve the desired results. The overall goals for this multi-year project are: restore and improve the sagebrush steppe ecosystem; restore and enhance greater sage grouse habitat; restore and enhance riparian systems and water quality, and improve big game habitat on public lands.

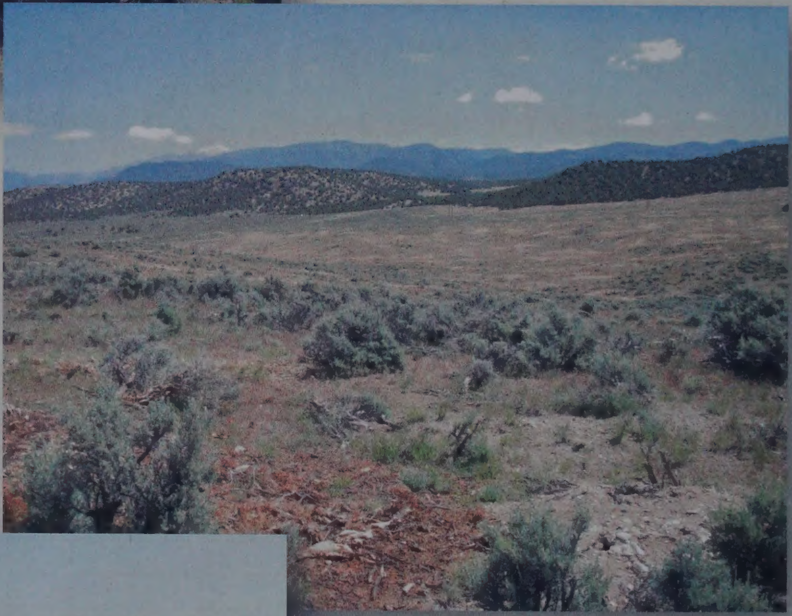


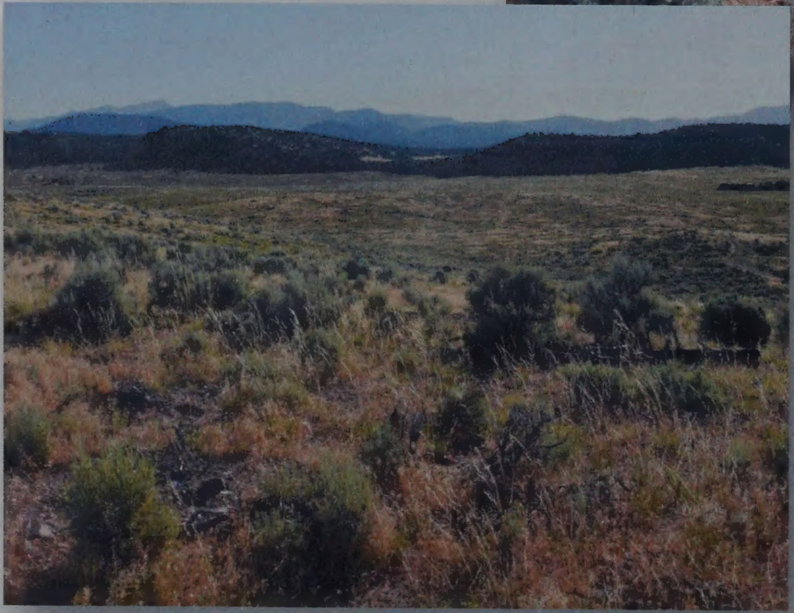
Year	Project	Treatment	Acres
2006 (Year 1)	South Beaver	Harrow/Seeding	1,665
2007 (Year 2)	South Beaver	Hand Thinning	1,428
2008 (Year 3)	South Beaver	Bullhog/Seeding	384
2008 (Year 3)	South Beaver (Div of Wildlife Resources)	Chaining	370
2010 (Year 4)	South Beaver	Bullhog/Seeding	1,642
2010 (Year 4)	South Beaver	Hand Thinning	138
2010 (Year 4)	South Beaver (Div of Wildlife Resources)	Chaining	410
2011 (Year 5)	South Beaver	Bullhog/Seeding	1,760
2011 (Year 5)	South Beaver	Hand Thinning	772
2011 (Year 5)	South Beaver	Harrow/Seeding	190
2011 (Year 5)	South Beaver	Riparian	63
2012 (Year 6)	South Beaver	Bullhog/Seeding	1,422
2013 (Year 7)	South Beaver	Bullhog/Seeding	946
2014 (Year 8)	South Beaver (Buckskin Valley)	Bullhog/Seeding	314
2014 (Year 8)	South Beaver (Buckskin Valley)	Harrow/Seeding	423
2014 (Year 8)	South Beaver (Buckskin Valley)	Hand Thinning	795
2015 (Year 9)	South Beaver (Dog Valley)	Hand Thinning	9,768
2015 (Year 9)	South Beaver	Hand Thinning (Maintenance)	4,500
2016 (Year 10)	South Beaver	Bullhog/Seeding	553
2016 (Year 10)	South Beaver	Harrow/Seeding	500
2017	South Beaver *	Bullhog/Seeding	1342
2017	South Beaver (Buckskin Valley)*	Hand Thinning	5500
2018	South Beaver *	Hand Thinning (Maintenance)	5200
Total			**40,085**

**Projects to be completed in the next 2 years.*



This area southeast of Beaver was mulched in the winter of 2013 which is similar to many treatments completed over the last several years. The areas were seeded with a variety of grasses and forbs, and several machines were brought in to mulch the pinyon and juniper trees to reduce competition and create a seedbed.

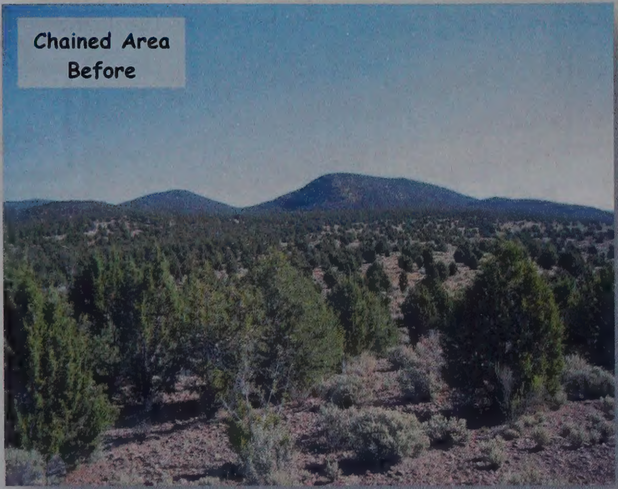


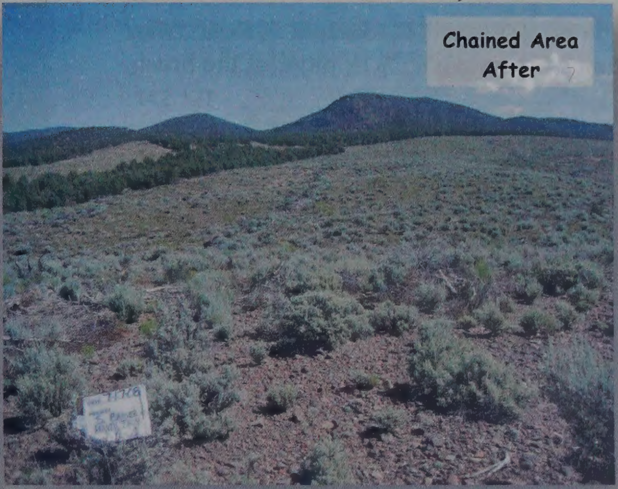


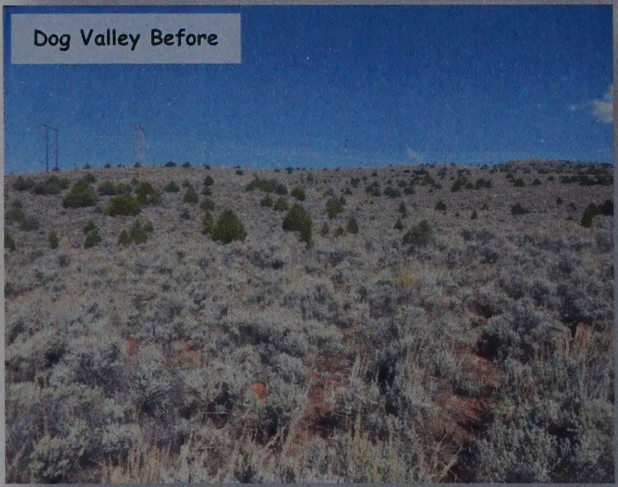
As can be seen 3 growing seasons later, these types of treatments are effective in meeting our goals of enhancing habitat and improving water quality.

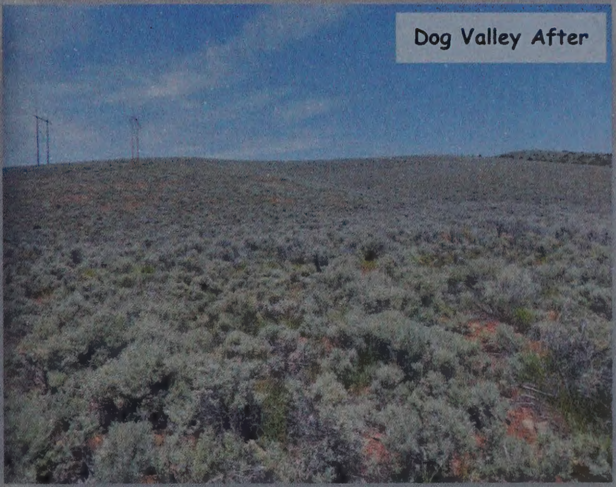
South Beaver Vegetation Enhancement

This area was chained in the 1960's but had trees encroaching into it. We hand thinned over 1400 acres and had good response from the shrubs and understory without seeding. This is historic sage grouse habitat and since the treatment, a few sage grouse have started using parts of the treated area. It is possible this and adjacent areas are a corridor to connect grouse currently using Dog Valley to the east, Buckskin Valley to the south and the Bald Hills to the west.





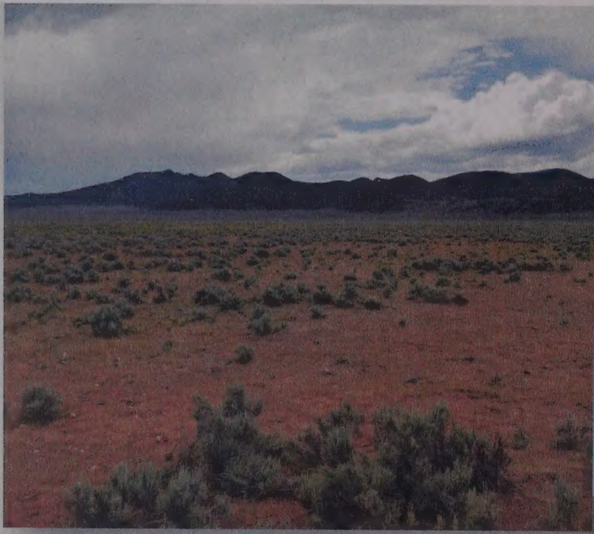


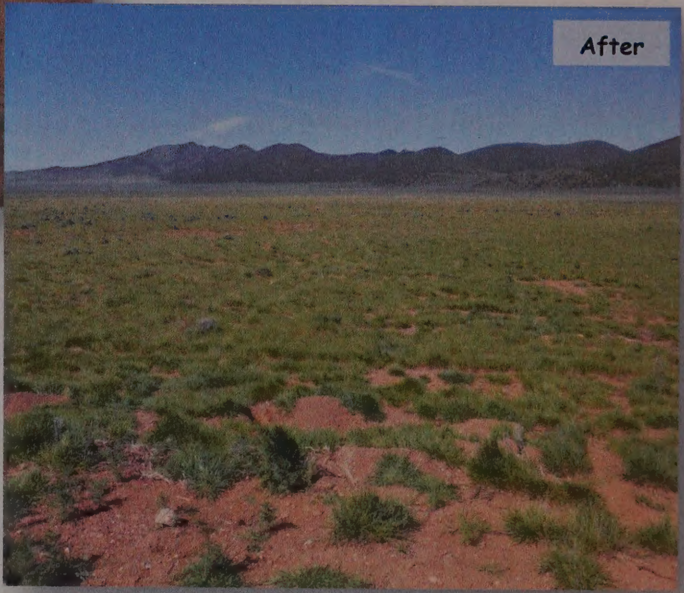


South Beaver Vegetation Enhancement

Several areas have been treated using a pipe harrow to remove shrubs and small trees. In Buckskin Valley, about 925 acres of sagebrush were treated in 2014 and 2016 using a pipe harrow and were seeded with a mixture of forbs and grasses. The treatment was designed in a mosaic pattern leaving many sagebrush islands to maximize edge for sage grouse, while areas near prairie dog habitat were harrowed multiple times to remove 95% or more of the brush.

Before





After

Typical Seed Mix for South Beaver

Species	Lbs/acre
Crested Wheatgrass	1.5
Bluebunch Wheatgrass	1
Indian Ricegrass	1
Intermediate Wheatgrass	0.5
Pubescent Wheatgrass	2
Sandberg Bluegrass	0.25
Siberian Wheatgrass	1.5
Snake River Wheatgrass	1.5
Alfalfa	1
Blue Flax	0.5
Palmer Penstemon	0.1
Sainfoin	0.5
Small Burnet	1
Yellow Sweetclover	0.5
Total Lbs/acre	**12.85**

South Beaver
Vegetation Enchancements

Map Created May 11, 2017

Color Country BLM
Fire & Fuels Managment

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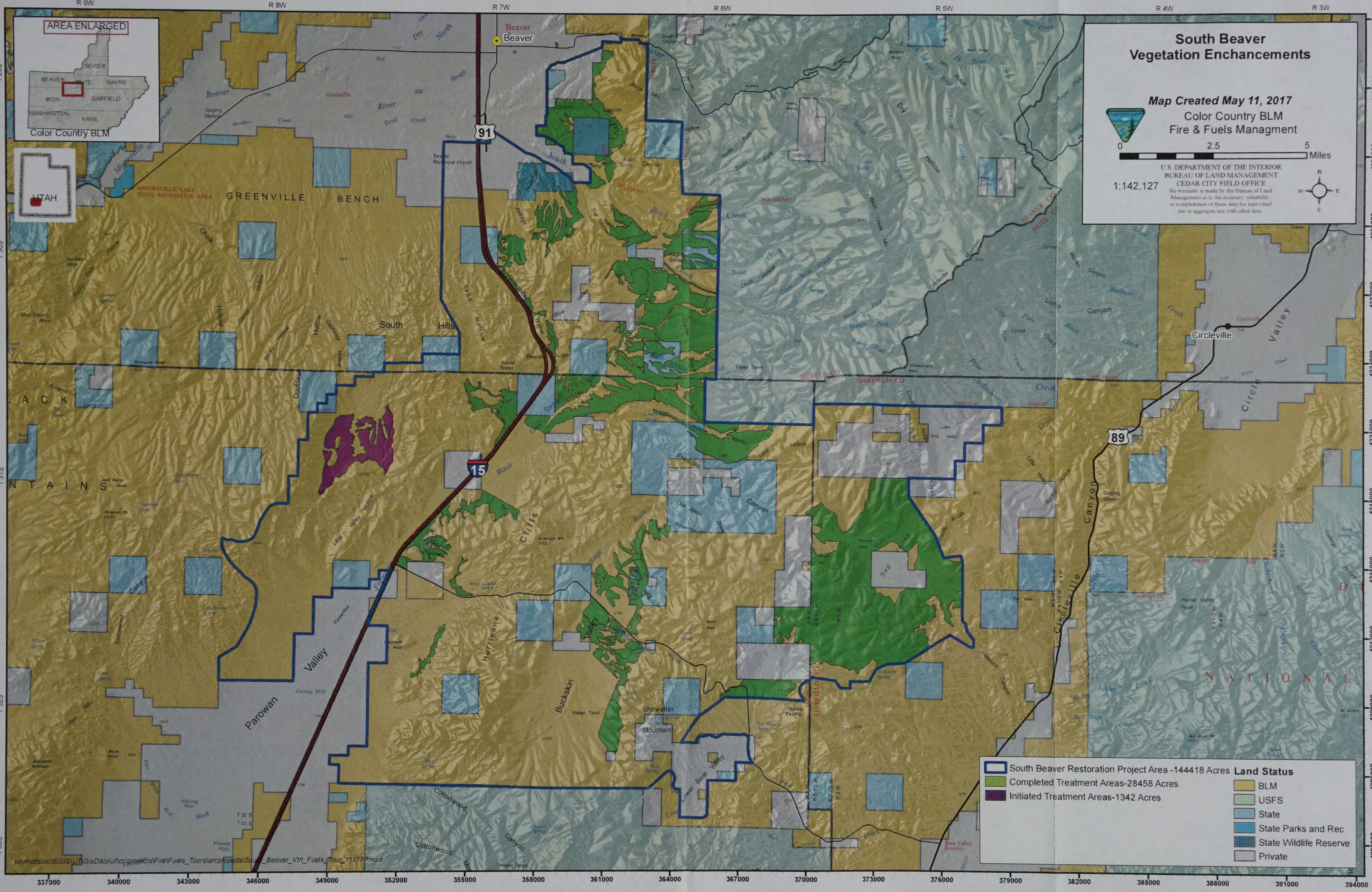


Utah Southern Collaborative
Wildland Fire Resilient Landscape

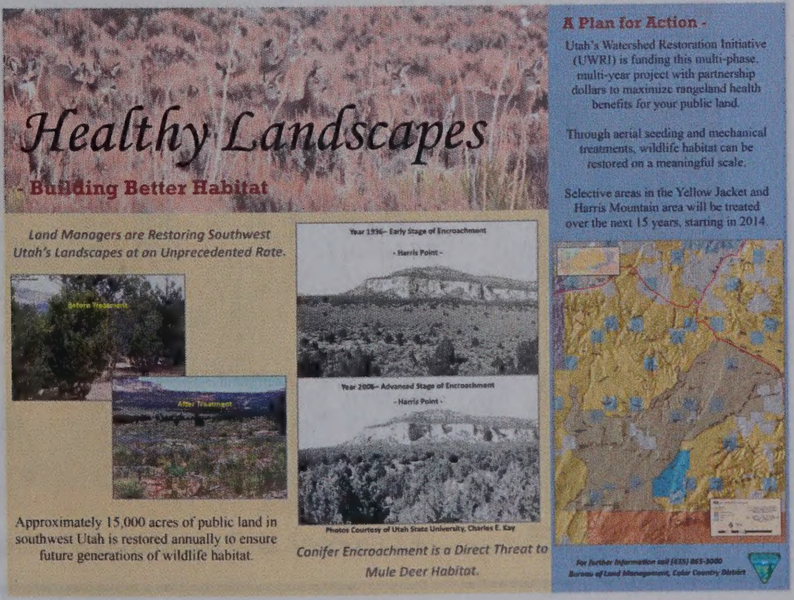
The Southern Utah Resilient Landscape Collaborative is one of ten Collaboratives selected by the Department of Interior's Resilient Landscape Program. The Collaborative is effectively implementing elements of the National Cohesive Wildland Fire Management Strategy and Secretarial Order 3336 on Rangeland Fire Prevention, Management and Restoration. The Collaborative is strengthening the Wildland Fire Management program's ability to restore and maintain resilient landscapes across all jurisdictions in an "all hands/all lands" approach to Resilient Landscapes in an integrated, place-based approach of partnerships among programs, activities, and organizations. Collaboration between the wildland fire and resource management programs has been occurring to address broad land-health outcomes and the ecological role of fire in fire-adapted ecosystems.

Southern Utah Resilient Landscape Collaborative Goal

To conserve, maintain, and restore sage brush communities to be resilient towards wildland fire and invasive species at a landscape scale while connecting and expanding existing populations and habitat of Greater Sage-Grouse and sagebrush obligate species while providing for the resiliency of these species.

Implementation of the Southern Utah Resilient Landscape Collaborative is occurring throughout the Richfield, Kanab, and Cedar City Field Offices of the Color Country District as well as within the Grand Staircase Escalante National Monument. Projects within the Collaborative receiving funding include Parker Mountain, Hamlin Valley, Yellow Jacket, and Pangiutch South Canyon. These areas were identified as being important Sage-Grouse habitat as part of the Southern Great Basin Fire and Invasive Species Tool (FIAT) Assessment. Three of these four areas were continuations of existing projects with Hamlin Valley being a new area where the BLM started focusing efforts in line with recommendations of the FIAT Assessment and a collaborative planning effort between BLM and The Nature Conservancy utilizing the TNCs Landscape Forecast Model.

The Resilient Landscape funds were leveraged with other funds including BLM Fuels Management, Wildlife, and Healthy Lands funds along with outside contributed funding from the Utah Watershed Restoration Initiative. For FY2015 a total of $5,252,500 went towards the implementation of 37,024 acres in treatments and over 53,000 acres in monitoring. These additional funds more than double the Resilient Landscape investment of $2.6 million. In FY2016 the Collaborative received $3.5 million in Resilient Landscape funding. Additional collaborative funds of $4,045,615 were leveraged towards 31,535 acres of treatments and 40,000 acres of monitoring.



Healthy Landscapes

- Building Better Habitat

Land Managers are Restoring Southwest Utah's Landscapes at an Unprecedented Rate.

Approximately 15,000 acres of public land in southwest Utah is restored annually to ensure future generations of wildlife habitat.

Photos Courtesy of Utah State University, Charles E. Kay

Conifer Encroachment is a Direct Threat to Mule Deer Habitat.

A Plan for Action -

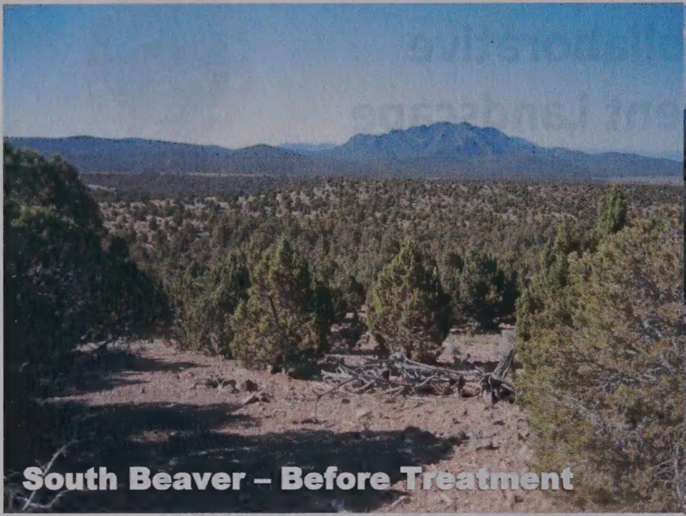
Utah's Watershed Restoration Initiative (UWRI) is funding this multi-phase, multi-year project with partnership dollars to maximize rangeland health benefits for your public land.

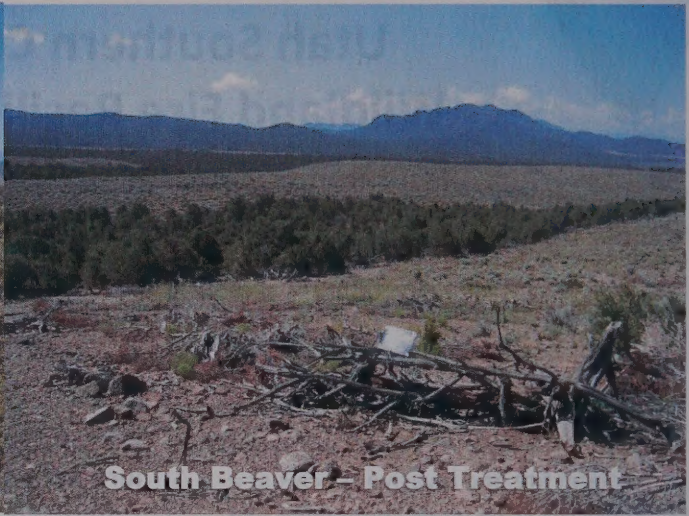
Through aerial seeding and mechanical treatments, wildlife habitat can be restored on a meaningful scale.

Selective areas in the Yellow Jacket and Harris Mountain area will be treated over the next 15 years, starting in 2014.

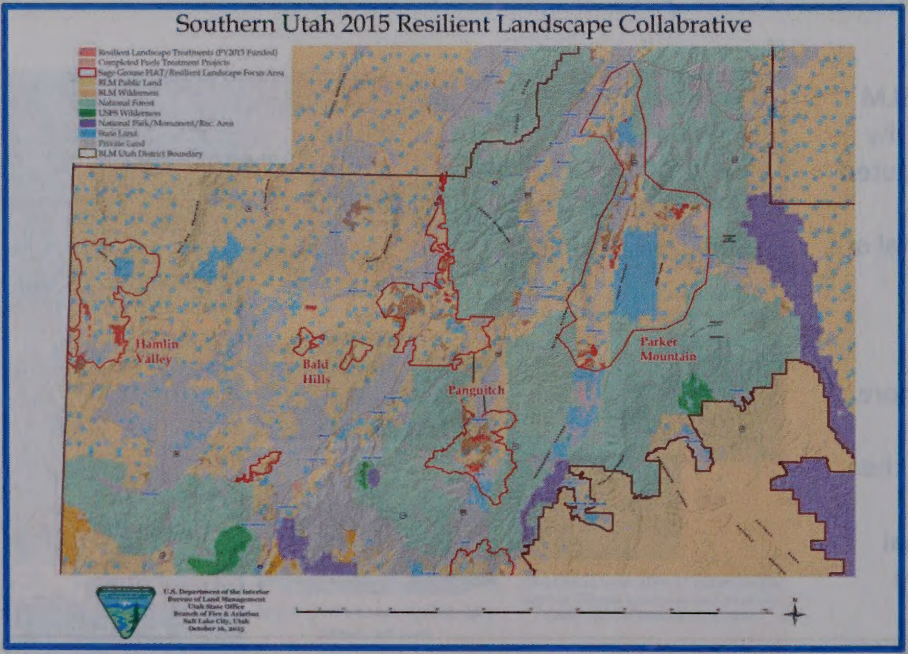
For further information call (435) 865-3000
Bureau of Land Management, Color Country District

Before Treatment
After Treatment
Year 1936– Early Stage of Encroachment
- Harris Point -
Year 2006– Advanced Stage of Encroachment
- Harris Point -





The following partners, many of which are part of the Utah Partnership for Conservation and Development, have contributed towards the Southern Utah Resilient Landscape Collaborative: Utah Department of Natural Resources, Utah Division of Forestry, Fire and State Lands, Utah Division of Wildlife Resources (UDWR) Habitat Council, UDWR Internal Conservation Permit-Deer and Pronghorn, Utah School and Institutional Trust Lands, Mule Deer Foundation, Rocky Mountain Elk Foundation, Sportsmen for Fish & Wildlife, Utah Bowman's Association, Safari Club International, Natural Resource Conservation Service, U.S. Fish and Wildlife Service, and Utah State University. The majority of the implementation work is being done through an assistance agreement with contracts issued by the State of Utah through the Utah Watershed Restoration Initiative.


Southern Utah 2015 Resilient Landscape Collabrative
Resilient Landscape Treatments (FY2015 Funded)
Completed Fuels Treatment Projects
Sage-Grouse HAT/Resilient Landscape Focus Area
BLM Public Land
BLM Wilderness
National Forest
USFS Wilderness
National Park/Monument/Rec. Area
State Land
Private Land
BLM Utah District Boundary
Hamlin Valley
Bald Hills
Panguitch
Parker Mountain
U.S. Department of the Interior
Bureau of Land Management
Utah State Office
Branch of Fire & Aviation
Salt Lake City, Utah
October 16, 2015

Vegetation and wildlife surveys and monitoring have been completed on all identified treatments by BLM and Utah Division of Wildlife Resources (UDWR) personnel. Efforts include rangeland health assessments, nested frequency transects, wildlife inventories for sensitive species, migratory birds, raptors and general wildlife inventory. Some areas had new transects and routes established for baseline data to measure the short and long term effects of the planned actions. In cooperation with Utah State University and Brigham Young University, Sage-Grouse have been captured and collard with GPS tracking devices to study the bird's reactions to treatments. The data from this research confirms utilization of treated areas by grouse, immediately post treatment. Where Resilient Landscape funding have been used to treat areas adjacent to occupied habitat, Sage-Grouse are utilizing these areas during critical periods of the year.

UWRI Funding (2005-2016)

2005-2016 Sum of $ Spent and Acres Treated

Region	Contributions		Acres Treated		Avg Cost/Acre
	$(millions)	%	#(thousands)	%	
Southern Region	$75,236,362.04	34%	672,600	53%	$111.86
Southeastern Region	$30,723,295.56	14%	102,819	8%	$298.81
Central Region	$29,557,383.67	13%	173,510	14%	$170.35
Northeastern Region	$23,707,585.59	11%	143,531	11%	$165.17
Northern Region	$38,531,239.71	17%	182,371	14%	$211.28
Salt Lake Office	$23,556,389.04	11%	NA		NA
Grand Total	**$221,312,255.61**	**100%**	**1,274,832**	**100%**	**$191.49**

-Southern Region Summary-

Manage

42% of state acres

Receive

34% of total funding

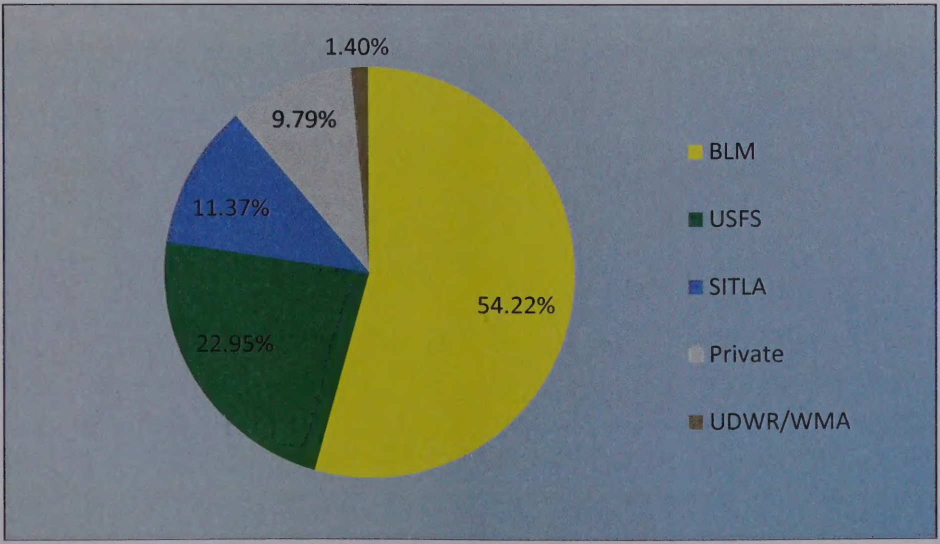
Accomplish

53% of WRI acres

Average Cost per Acre

$111.86

Southern Region Acres Treated 2005-2016 by ownership*



*State parks, Indian Reservation and National Park Service <1%

Duncan Creek Interface Project

Introduction

This area has been a focus for Forestry, Fire and State Lands, Bureau of Land Management and Utah Division of Wildlife Resources both from a wildland urban interface fire/fuels perspective and from a wildlife perspective.

Project objectives for the 11,678 acre area include:

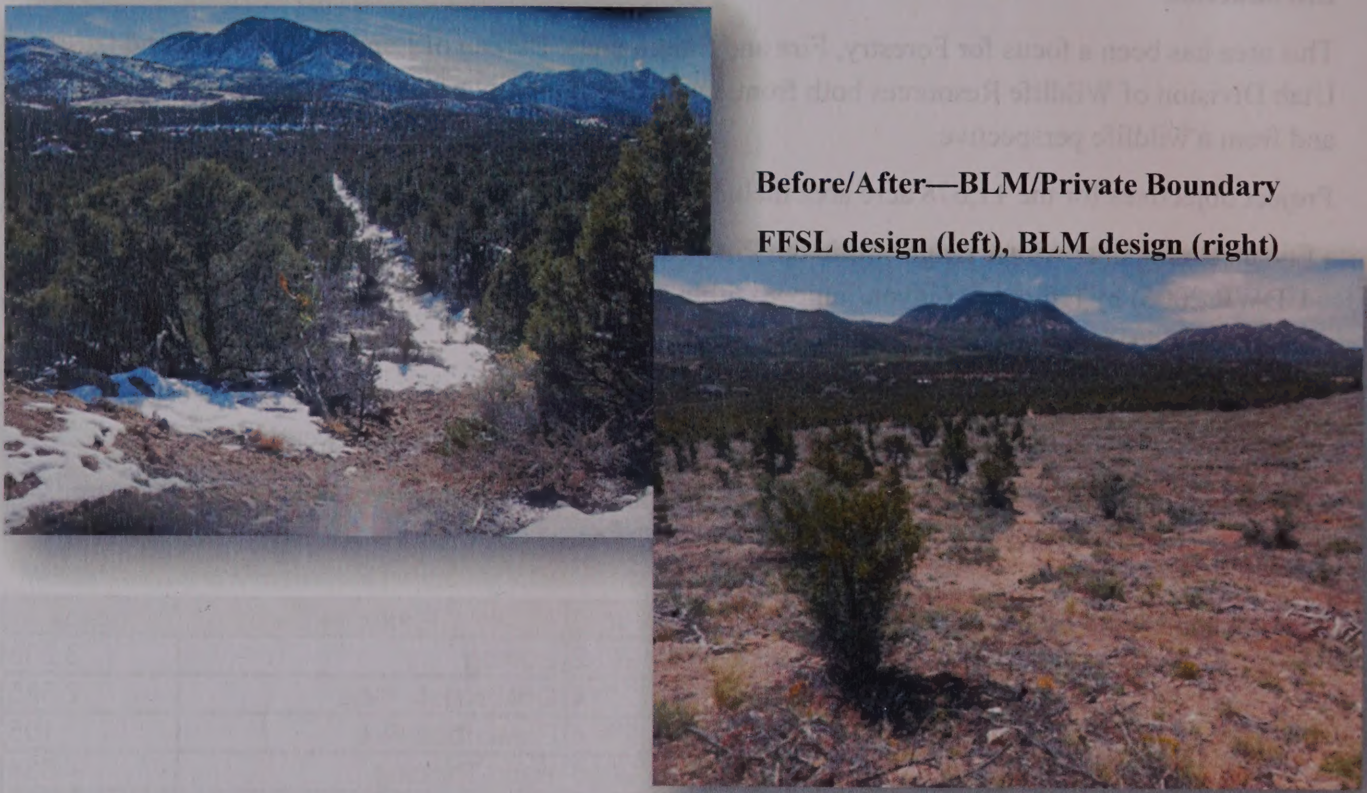
- Enhance mule deer winter range within the Pine Valley Herd Unit (Management Plan #30 UDWR 2006) by removing pinyon/juniper within mountain shrub areas and along the Highway Corridor.
- Reduce the fire risk to four designated communities at risk, including Comstock, Farr West, Quichipah and Old Iron Town by removing hazardous fuels in and around Swett Hill.
- Improve rangeland conditions within the shrub-steppe and mountain shrub zones.

Partners

Bureau of Land Management
Forestry Fire and State Lands
UNEV Pipeline (Mitigation)
Mule Deer Foundation
National Wild Turkey Federation
Private Landowners
Division of Wildlife Resource
Utah's Watershed Restoration Initiative
Sportsmen for Fish and Wildlife

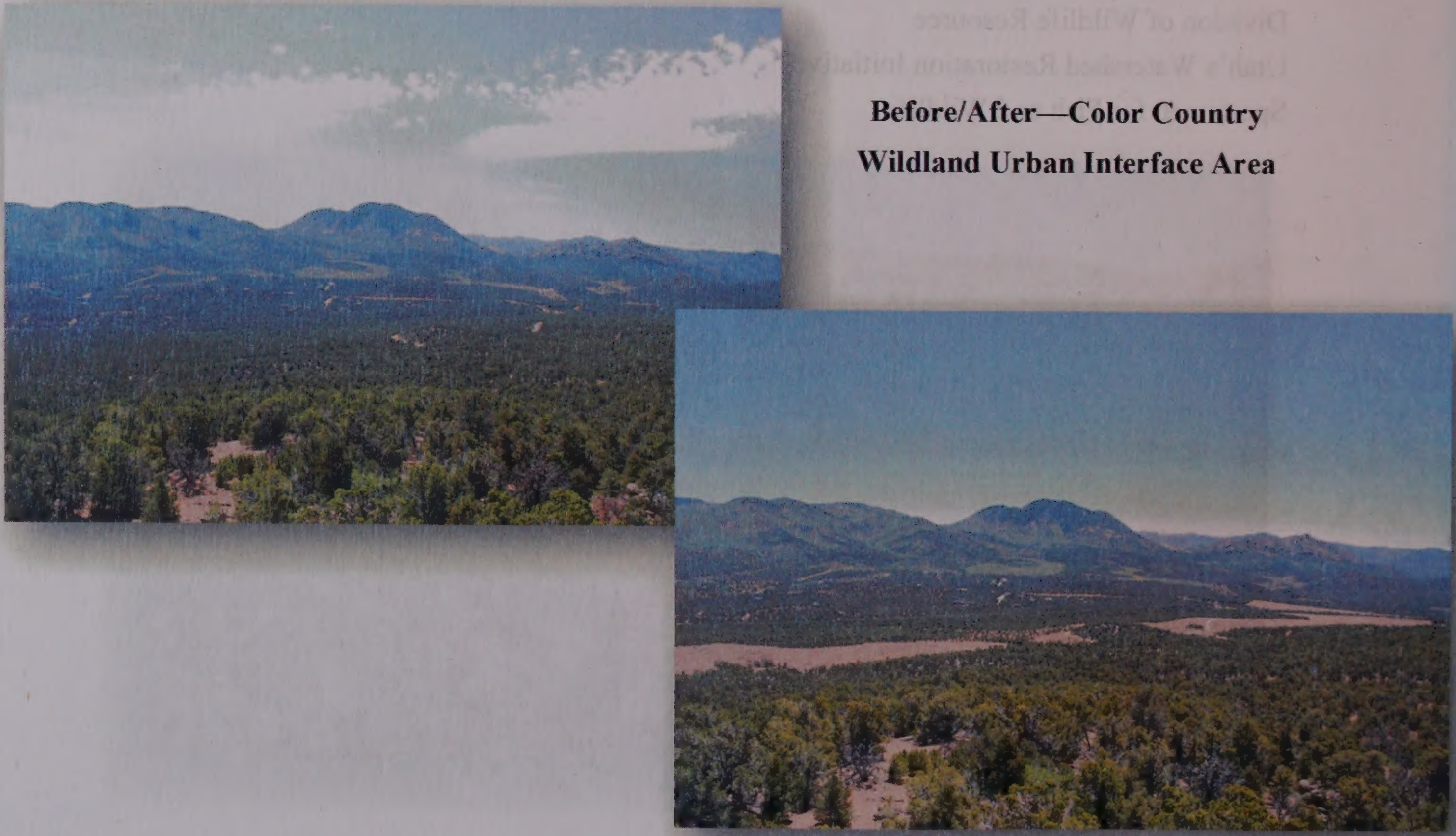
Year	Treatment	Acres
2012	Bullhog	3,205
2014	Chaining; bullhog	2,635
2014	Prescribed Fire	105
2016	Hand Thinning	634
Total		**6,579**

Duncan Creek Interface Project



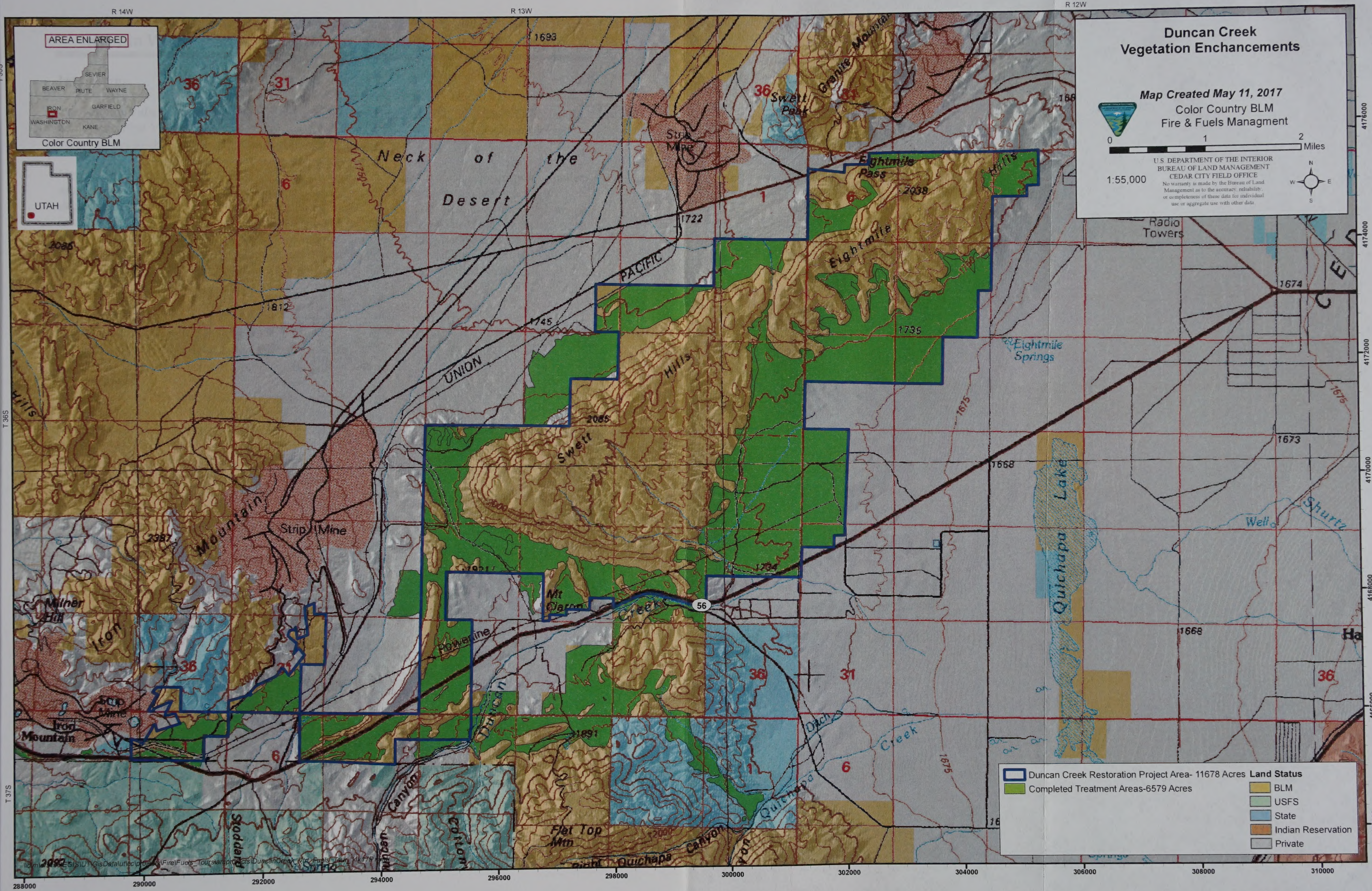
Before/After—BLM/Private Boundary

FFSL design (left), BLM design (right)



Before/After—Color Country

Wildland Urban Interface Area



Duncan Creek Vegetation Enchancements

Map Created May 11, 2017

Color Country BLM
Fire & Fuels Managment

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Hamlin Valley Resource Protection and Habitat Improvement

Introduction

The Hamlin Valley Vegetation Enhancement Project encompasses 192,253 acres within Hamlin Valley and Pine Valley. The area contains a diverse landscape that provides important forage values to livestock, wildlife and wild horses.

Vegetative communities are predominantly pinyon pine and juniper; and sagebrush with smaller areas of mountain shrub, ponderosa pine, aspen, and mixed conifer. Many of these areas are declining in health due to a variety of factors. Successive years of drought, combined with an increase in activity of the pinyon engraver beetle have resulted in pockets of pinyon pine mortality and a build-up of fuel loads. Fire suppression and historic grazing practices have resulted in fewer understory forbs and grasses; thereby, providing for a higher density of shrub and tree cover and a greater potential for high-intensity fires throughout the project area.

Objectives

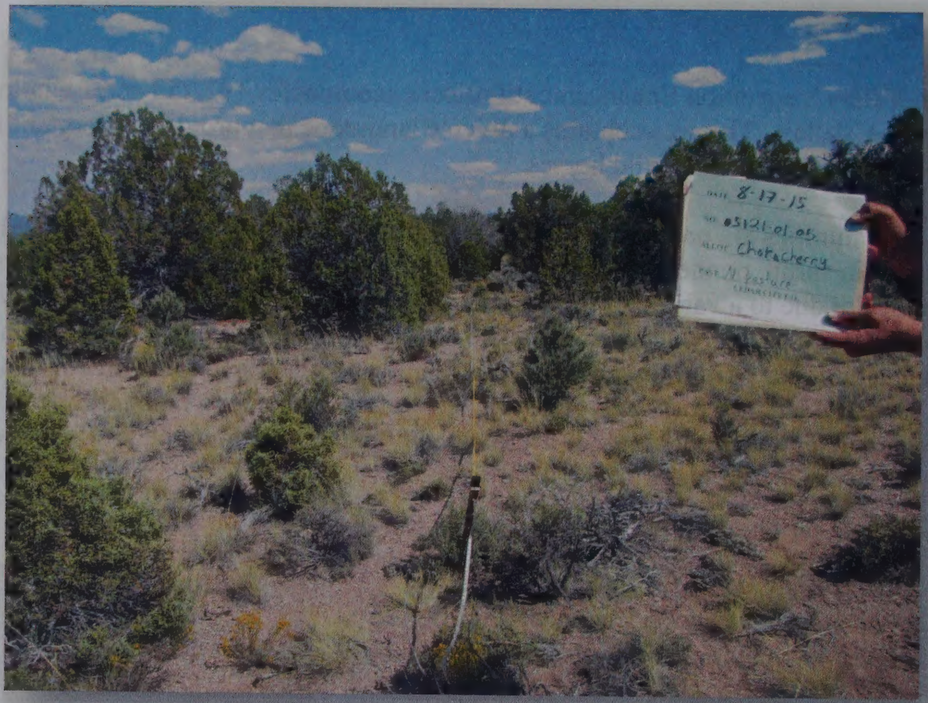
- Improve BLM/State Sensitive Species Habitat
- Provide a diverse habitat for a variety of wildlife
- Protect important habitats from devastating wildland fire effects
- Provide for the long-term maintenance/attainment of the Standards and Guidelines for Healthy Rangelands
- Provide for Soil/Site Stability by Decreasing Bare Ground
- Provide for Hydrologic Function
- Provide for Integrity of the Biotic Community
- Improve vegetative diversity, composition and productivity
- Reduce pinyon pine and juniper encroachment within sagebrush ecological sites
- Improve livestock, wild horse and wildlife distribution patterns
- Protect community infrastructure
- Provide for a safe fire suppression environment
- Provide links with natural fuel breaks in adjacent areas

Seed Mix

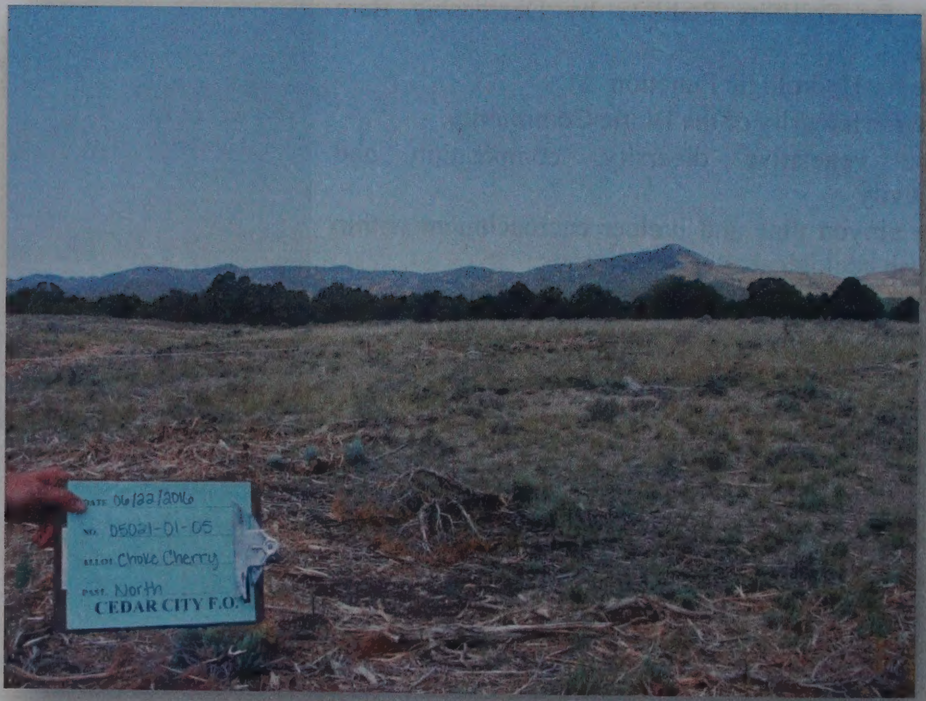
Species	Lbs/acre
Bluebunch Wheatgrass	3
Western Wheatgrass	1.5
Thickspike Wheatgrass	1.5
Indian Ricegrass	3
Alfalfa	0.5
Lewis Flax	0.25
Scarlet Globemallow	0.1
Palmer Penstemon	0.4
Showy Goldeneye	0.1
Western Yarrow	0.1
Arrowleaf Balsamroot	0.1
Fernleaf Biscuitroot	0.1
Thickleaf Penstemon	0.1
Gooseberryleaf Globemallow	0.1
Utah Sweetvetch	0.1
Sainfoin	1
Small Burnet	1
Wyoming Big Sagebrush	0.25
Black Sagebrush	0.25
Total Lbs/Acre	13.45

Treatment Project Acres to Date

Treatment	Acres
Chaining	1,892
Bullhog	2,690
Lop and Scatter	1,614
Propopsed	16,466
Total	**22,662**



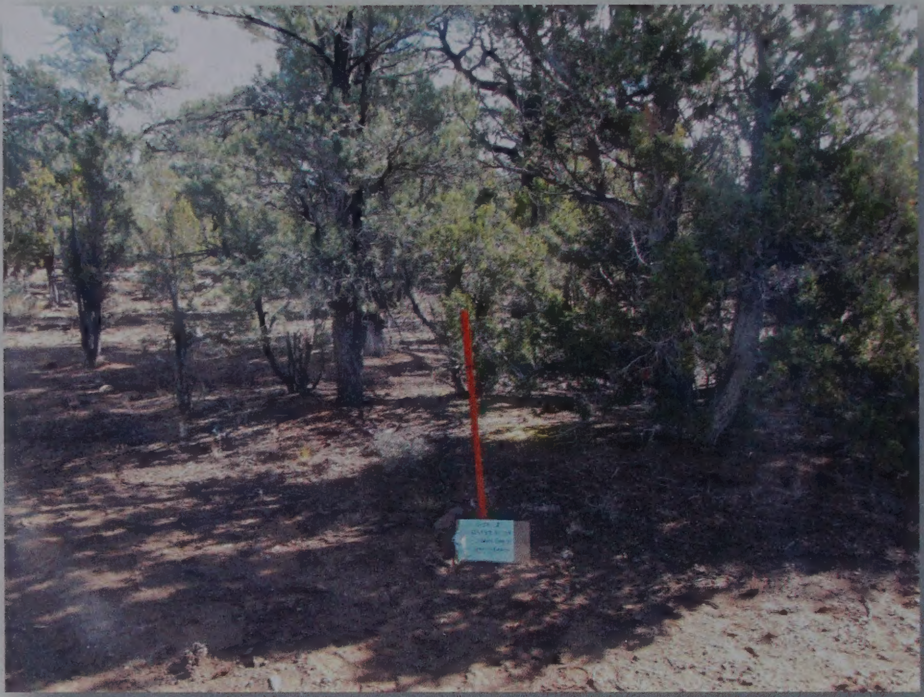
Chokecherry – Bullhog (Before Treatment 2015)



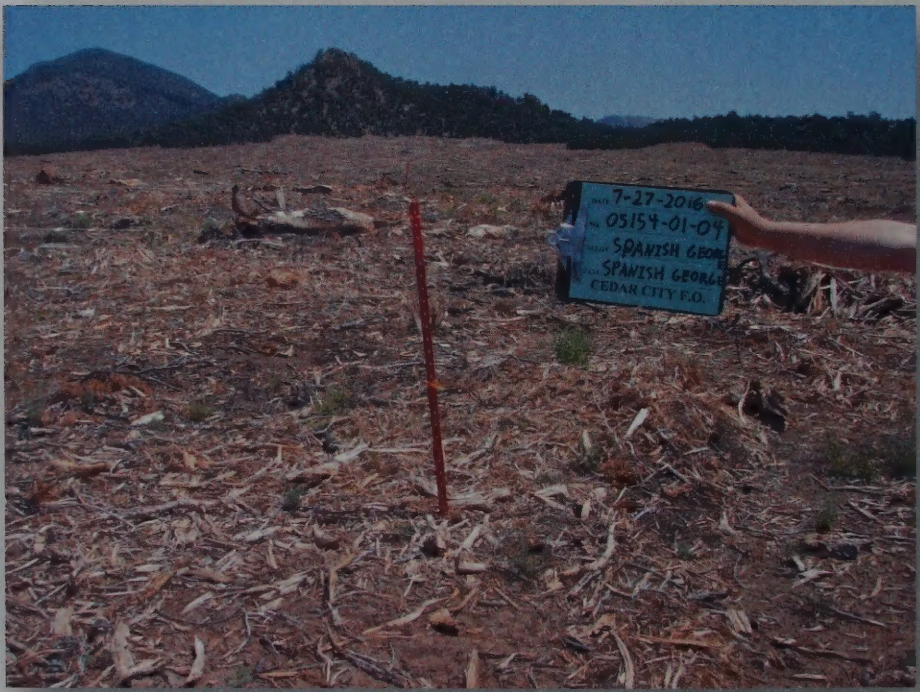
Chokecherry – Bullhog (After Treatment 2016)

Chokecherry – Lop and Scatter (Before Treatment 2015)

Chokecherry – Lop and Scatter (Before Treatment 2015)

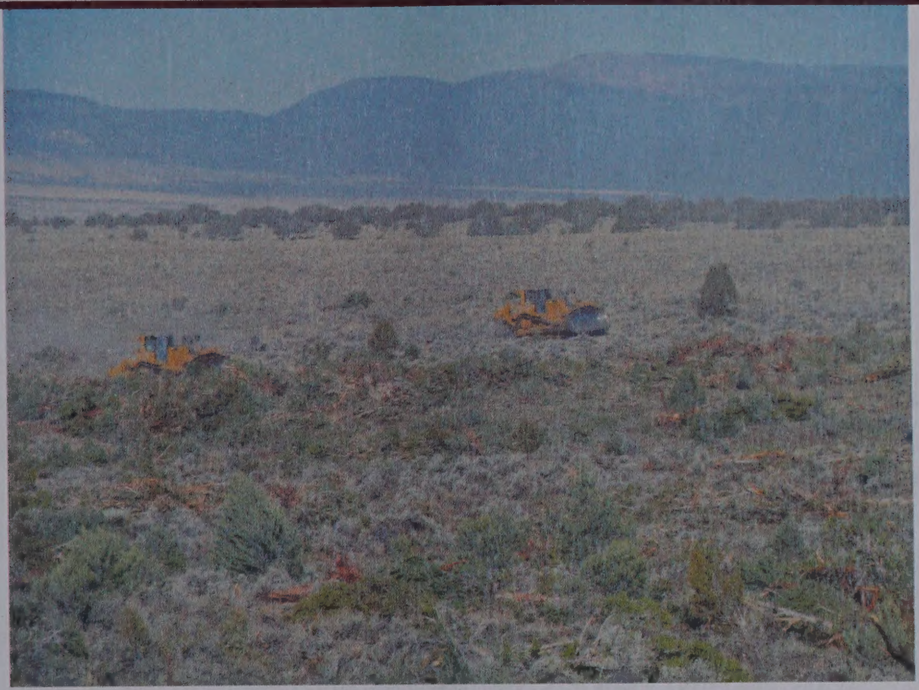


Spanish George – Bullhog (Before Treatment 2015)



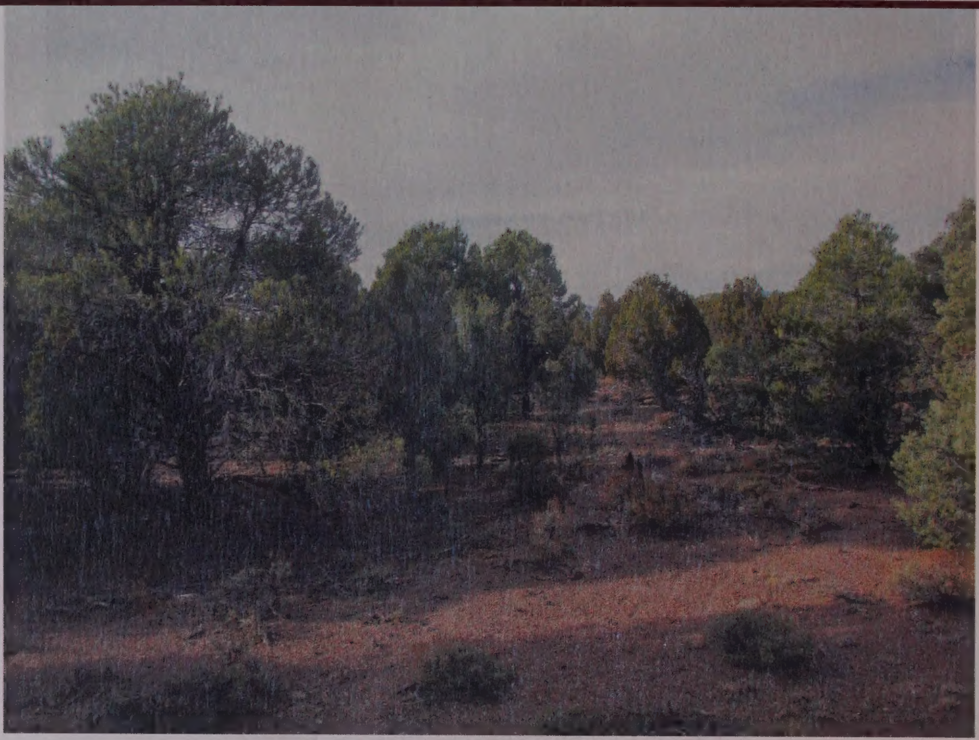
Spanish George – Bullhog (After Treatment 2016)

Hamlin Valley Resource Protection and Habitat Improvement

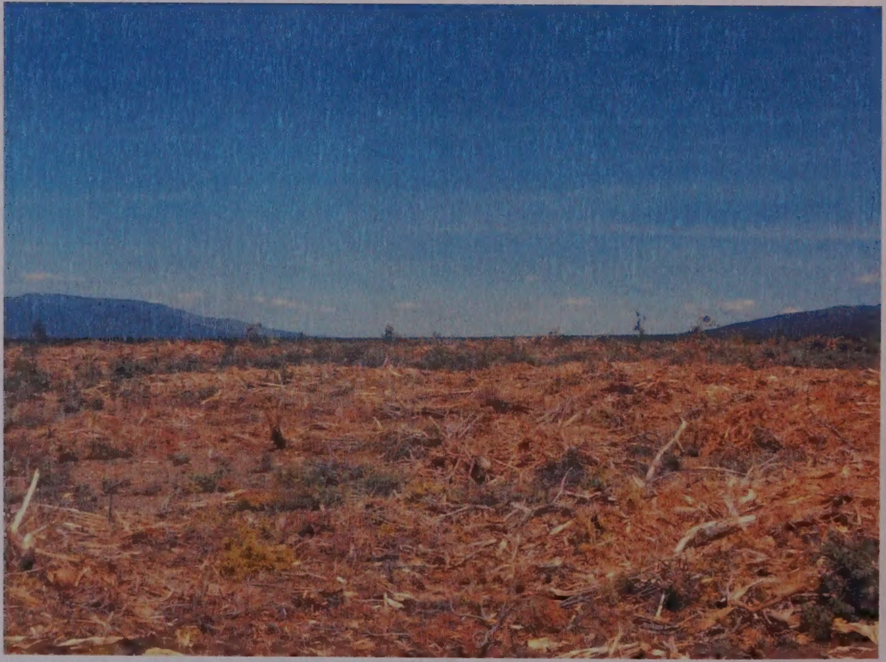


Spanish George – Chaining (October 2016)

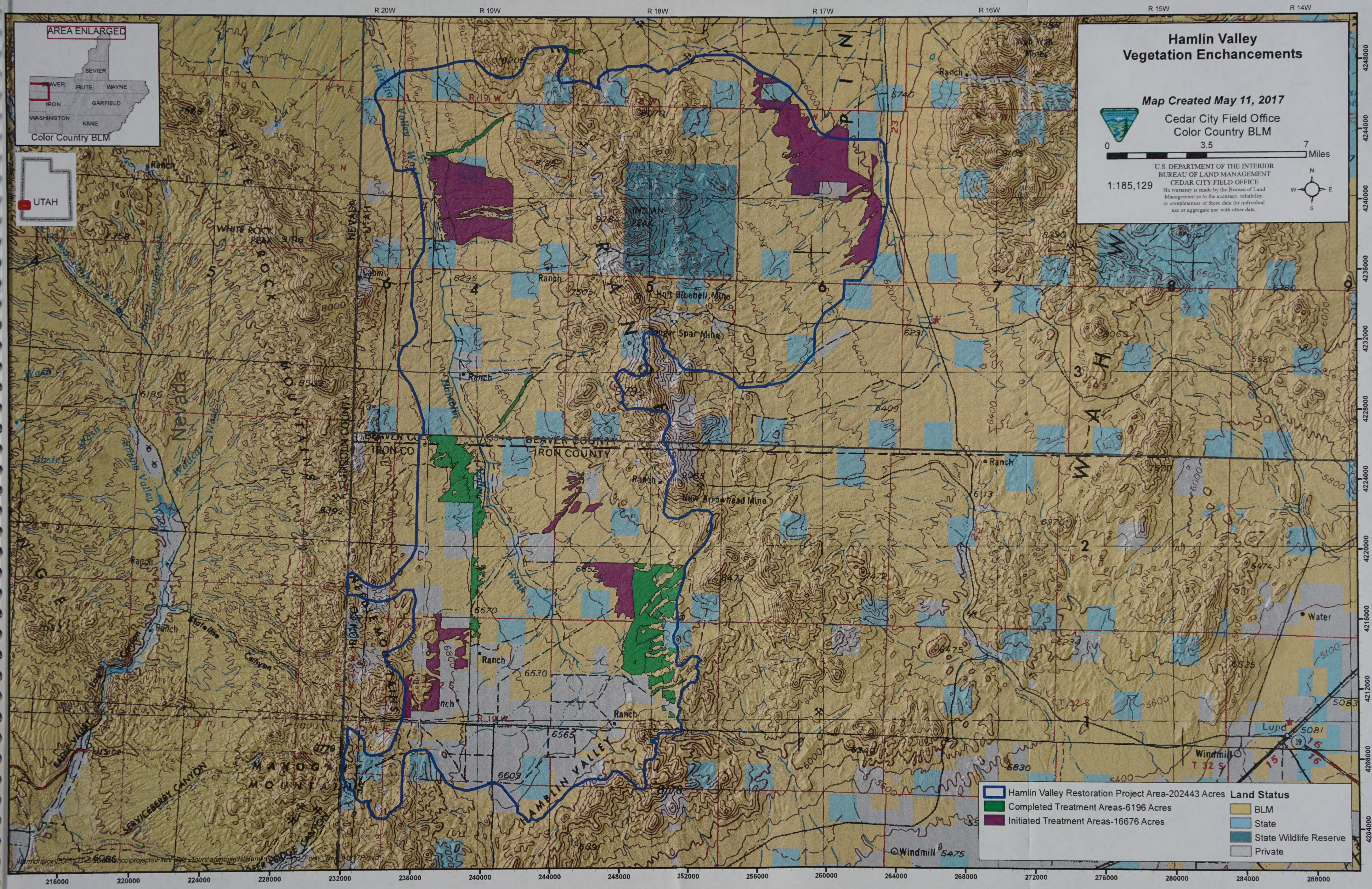
Hamlin Valley Resource Protection and Habitat Improvement



Spanish George – Bull Hog (Before Treatment October 2016)



Hamlin Valley Vegetation Enchancements



Map Created May 11, 2017

Cedar City Field Office
Color Country BLM

1:185,129

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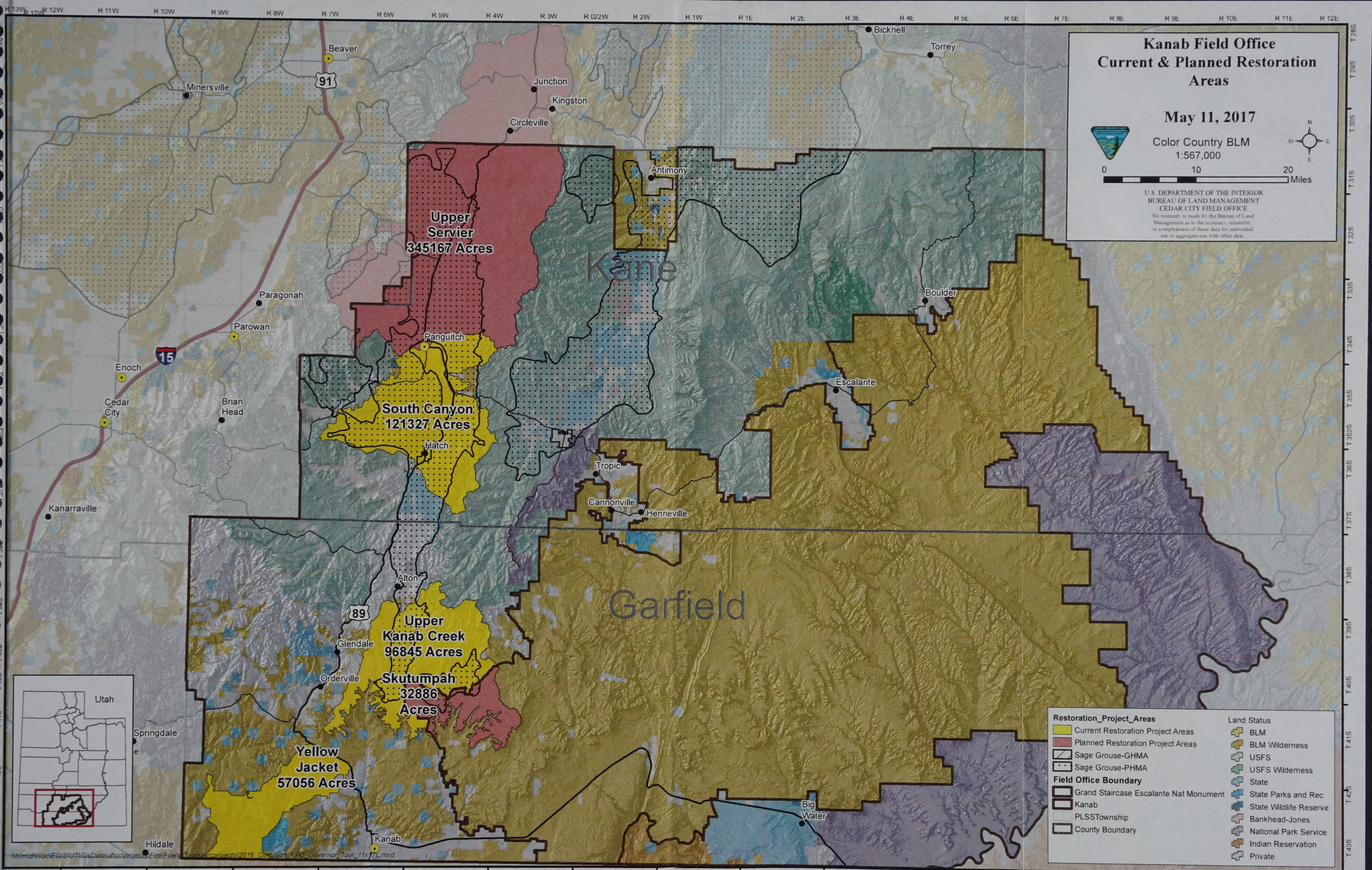
- ▢ Hamlin Valley Restoration Project Area-202443 Acres
- 🟩 Completed Treatment Areas-6196 Acres
- 🟪 Initiated Treatment Areas-16676 Acres

Land Status

- 🟨 BLM
- 🟦 State
- ▨ State Wildlife Reserve
- ⬜ Private



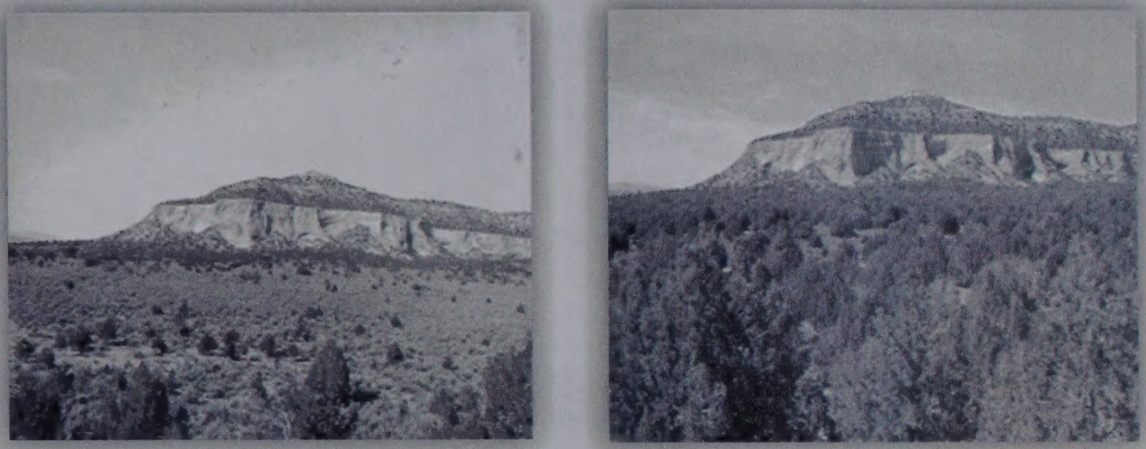
Kanab Field Office Current & Planned Restoration Areas

May 11, 2017

Yellowjacket Vegetation Enhancement

Introduction

The Yellowjacket Vegetation Enhancement Project consists of three sub-watersheds within the Lower Colorado – Lake Mead watersheds. Of particular concern within the project area is the expansion and infilling of pinyon and juniper trees into areas once dominated by shrubs and herbaceous vegetation such as perennial grasses and forbs. The expansion and infilling of pinyon and juniper affects soil resources, water and nutrient cycles, water quality and sedimentation, fire regimes, fuel loading, plant community structure and composition, forage production and wildlife habitat.



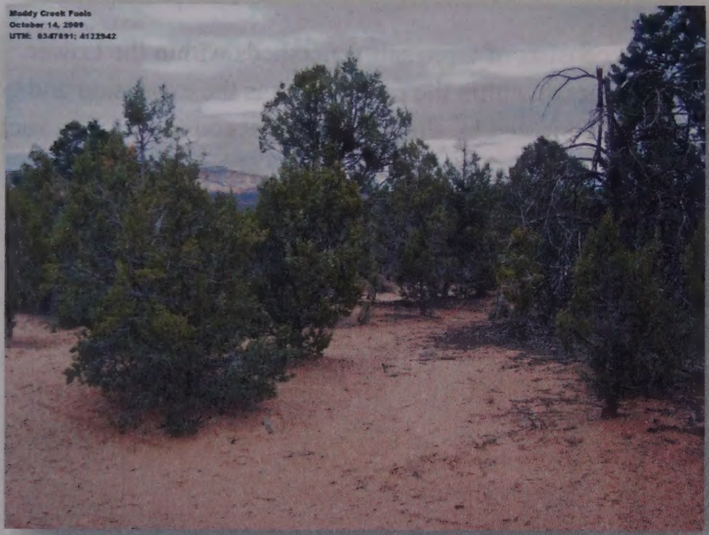
Harris Point 1936 – 2006, viewed north across Harris Flat to Harris Flat Point (6,666 ft). Pinyon and juniper now block the original camera station, so the retake was made from the nearest open area. Pinyon and juniper have increased, while sagebrush has declined. Original photograph taken by J.C. Anderson (No. 5) in 1936; retake by Charles E Kay on June 4, 2006.

Objectives

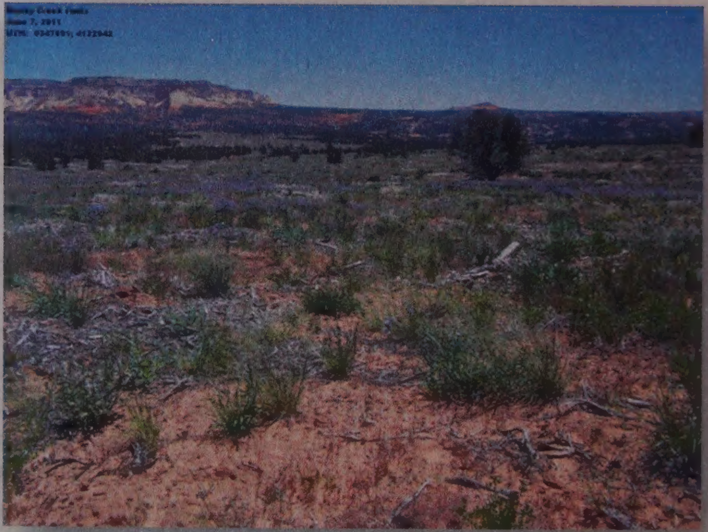
- Maintain and improve vegetative diversity and age class structure by reintroducing healthy, viable perennial grasses, forbs and shrubs on approximately 30,000 acres.
- Re-establish and maintain diverse sagebrush semi-desert habitat.
- Improve wintering and seasonal mule deer habitat by opening travel corridors, reducing encroaching pinyon and juniper and seeding perennial grasses, forbs and shrubs.
- Reduce the risk of catastrophic wildfire by decreasing the impact of wildfire to the outlying residential properties of Cave Lakes and Best Friends, UT.
- Reduce sedimentation through erosion into Kanab Creek and Colorado River.

Seedmix

Species	Lbs/acre
Indian Ricegrass	3.0
Western Wheatgrass	1.5
Siberian Wheatgrass	1.0
Pubescent Wheatgrass	1.0
Muttongrass	0.5
Sand Dropseed	0.1
Flax	1.0
Sainfoin	1.0
Small Burnet	1.0
Bitterbrush	0.5
Lbs/acre	**10.6**



Before Treatment (2009)

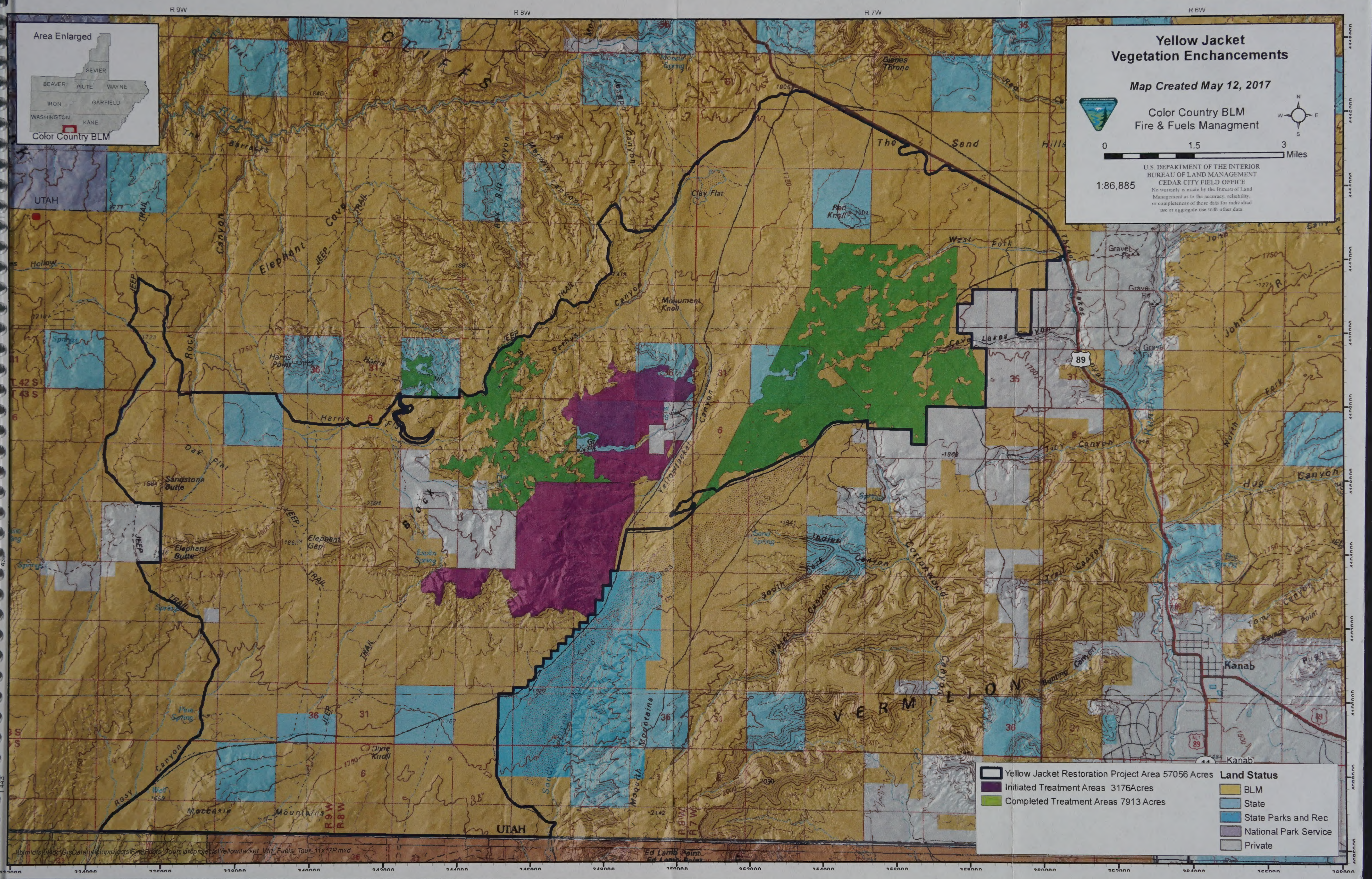


After Treatment (2011)

Treatment Project Acres to Date

Year	Project	Treatment	Acres
2013	Yellowjacket (Kinnickinnic)	Bullhog/Seeding	2,147
2014	Yellowjacket (Cave Lakes)	Bullhog/Seeding	1,776
2015	Yellowjacket (Farm Canyon)	Bullhog/Seeding	1,732
2016	Yellowjacket (Harris Mountain)	Bullhog/Seeding	1,986
2017	Yellowjacket (Buck Pasture)*	Bullhog/Seeding	2,000
2017	Yellowjacket (Buck Pasture)*	Chaining	1,200
Total			**10,841**

*Project will be completed fall of 2017.



Yellow Jacket Vegetation Enchancements

Map Created May 12, 2017

Color Country BLM
Fire & Fuels Managment

1:86,885

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▭ Yellow Jacket Restoration Project Area 57056 Acres
🟪 Initiated Treatment Areas 3176Acres
🟩 Completed Treatment Areas 7913 Acres

Land Status

🟨 BLM
▨ State
🟦 State Parks and Rec
▨ National Park Service
⬜ Private

Upper Kanab Creek Vegetation Enhancement Project

Introduction:

The Kanab Creek Project Area is located within the BLM Kanab Field Office (Kane and Garfield counties). The Kanab Watershed has recently received a lot of attention because it contains the westernmost population of Greater Sage Grouse in the United States and it is home to the Paunsagunt mule deer herd. The BLM, Utah's Watershed Restoration Initiative and the Natural Resources Conservation Service, as well as area landowners, have placed a significant amount of planning and project implementation dollars into the middle portion of the watershed (Upper Kanab Creek) over the past 3 years (~$3,000,000). In addition, the BLM Color Country District and BLM Kanab Field Office have taken the lead in developing a multi-year watershed level National Environmental Policy Act (NEPA) document, which helps to fund and prioritize resource issues within the watershed. NRCS recently adopted the BLM NEPA document to assist landowners within private lands in this area with funding provided through the NRCS Sage Grouse Initiative.

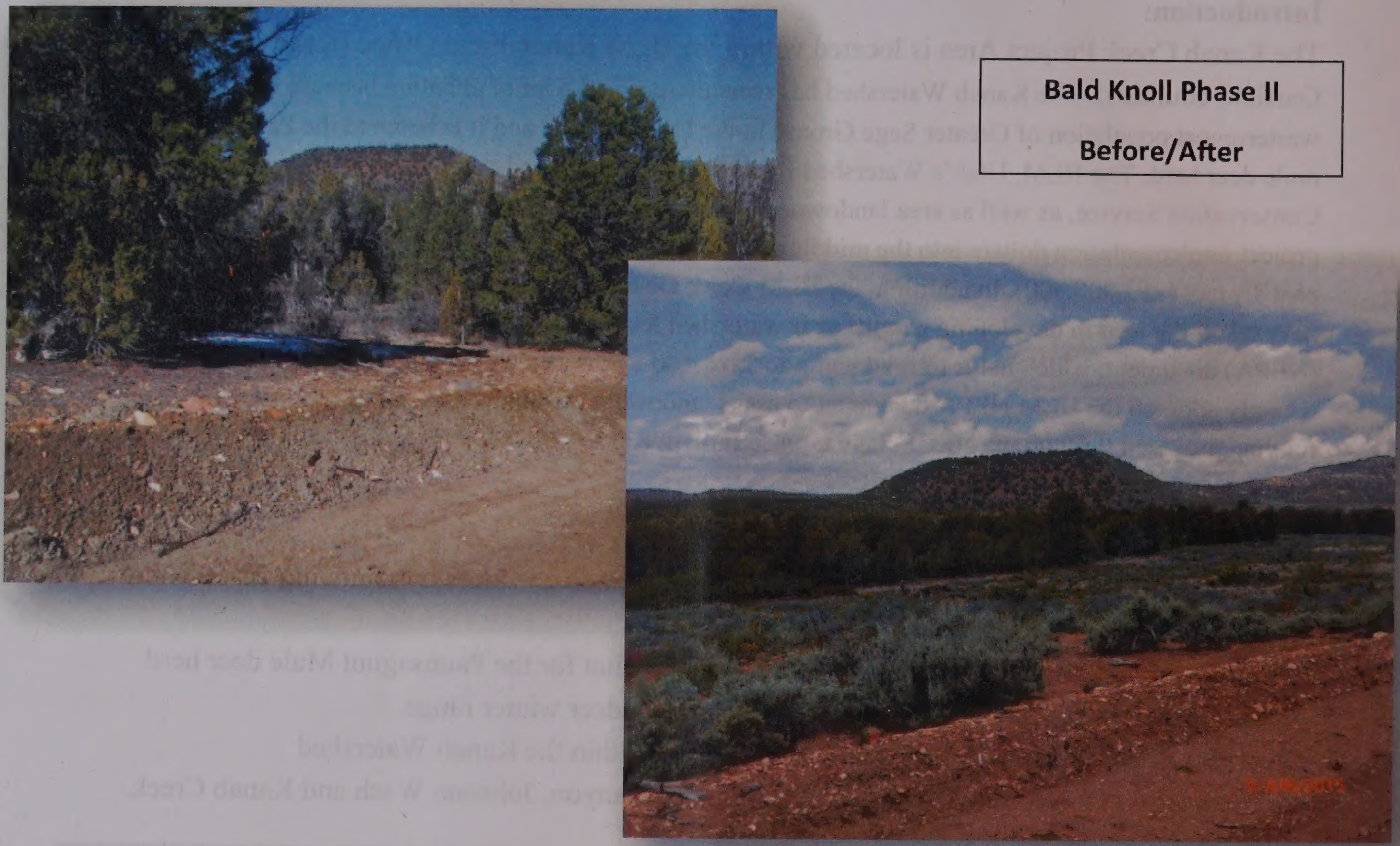
Objectives:

Project Goals for the next five years include:

- Increase available sage grouse habitat and create migration corridors by removing encroaching pinyon/juniper on 8,000 acres.
- Improve forage, migration corridors and available habitat for the Paunsagunt Mule deer herd and elk by revegetating 6,000 acres of critical mule deer winter range.
- Decrease active erosion on 15,000 acres of uplands within the Kanab Watershed
- Address known water quality issues in Cottonwood Canyon, Johnson Wash and Kanab Creek.

Treatment	Acres
Mastication/Bullhog	9,939
Chaining	1,254
Hand thin	3,108
Lop and Scatter	4,937
Proposed	7,471
Total	**26,709**

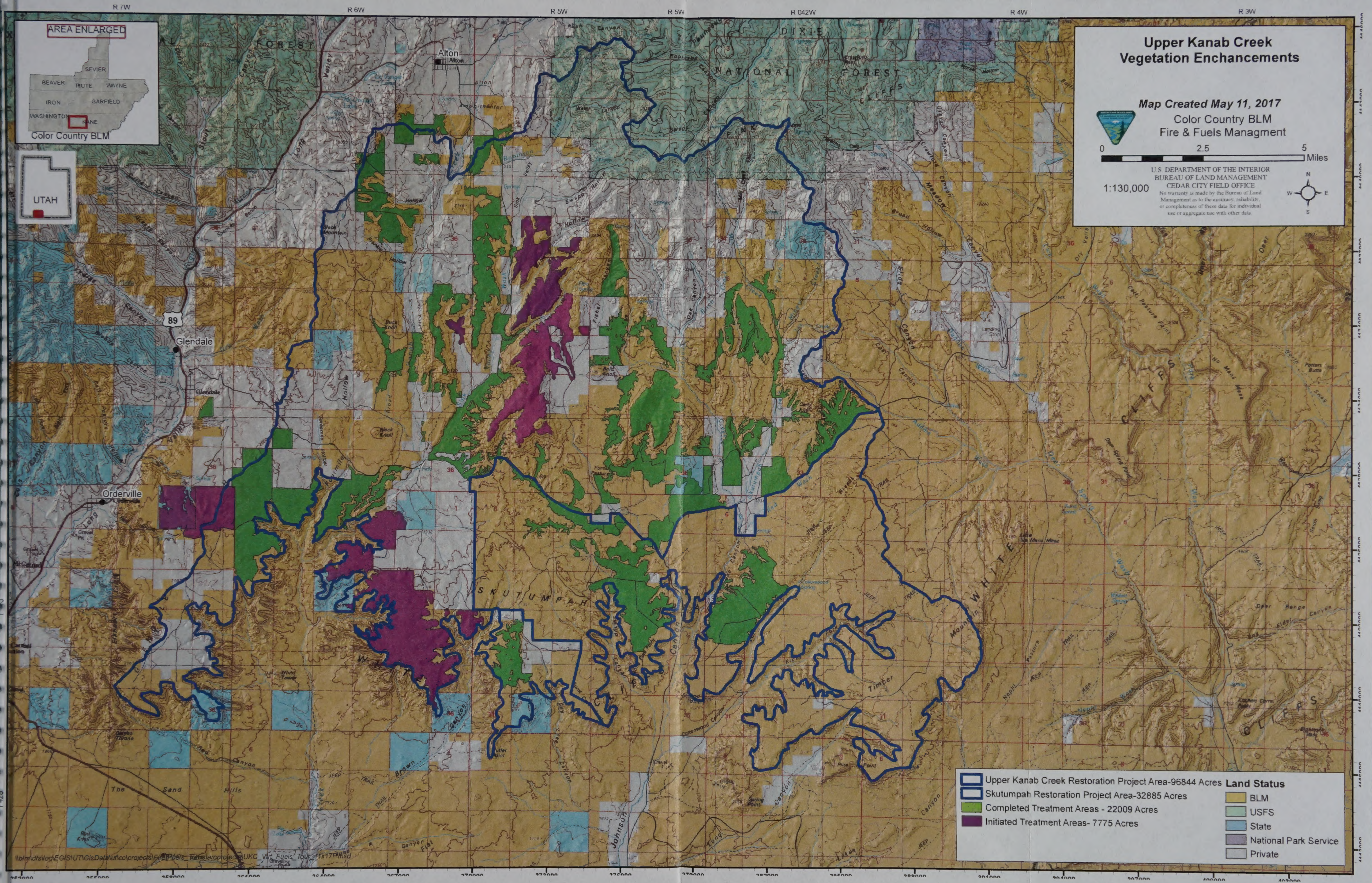
Upper Kanab Creek Vegetation Enhancement Project



Bald Knoll Phase II

Before/After

Species	lbs/ac											
	Mill Creek (2008)	Alton SG (2010)	Bald Knoll 1 (2012)	Bald Knoll II (2013)	Bald Knoll III (2014)	Thompson Creek (2014)	Alton II (2015)	Carly Knoll (2015)	Cotton wood (2015)	Coal Hollow (2015)	Sink Valley (2016)	Cottonwood II (2016)
Alfalfa	1	2	1	2	2	2	1	0.5	2		2	
Crested Wheatgrass	2.5	2	1.5	1.5	1.5	1.5	0.5	1.5	1	1	1	1
Indian Ricegrass	1.5	1	2	2	2	2	1.5	2	1	1.25	2	2
Intermediate Wheatgrass	2	1										
Sandberg Bluegrass		0.5	1			1				1		
Western Wheatgrass		1										
Thickspike Wheatgrass		1										
Forage Kochia	0.5	1		1.5	1	1			0.5		0.5	0.5
Small Burnett	1	2	1.5	1.5	1.5	1.5	2	1.5	2	1.25		0.25
Yellow Sweet Clover		1		1	1					1		
Blue Flax	0.5	1	1	1	1	1	1.25	1	0.25	1	0.25	0.1
Western Yarrow		0.1					0.1			0.1		
Snake River Wheatgrass	2.5		1.5	1.5	1.5	1.5	1.5	1.5	1		1	2
Pubescent Wheatgrass			1.5	1.5	1.5	1.5	1.5	1.5	1.5	1	1	
Sanfoin			0.1	0.1	0.1	0.1	2	0.1	0.1	1	2	
Palmer Penstemon			0.25	0.25	0.25	1		0.25	0.5		0.25	
Russian Wildrye			0.5	1.5	1.5	0.5		1.5	1	0.5	0.5	1
Alsike Clover						1						
Cicer Milkvetch						1						
Sunflower							0.5					0.25
Firecracker Penstemon							0.25					
Gooseberry Globemallow							0.5					
Prairie Coneflower							0.1					
Rocky Mountain Bee Plant							0.1					0.2
Rocky Mountain Penstemon							0.1			0.1		
Total lbs/ac	11.5	13.6	11.85	15.35	14.85	16.6	11.85	11.35	10.85	9.2	10.5	7.3



Upper Kanab Creek Vegetation Enchancements

Map Created May 11, 2017

Color Country BLM
Fire & Fuels Managment

1:130,000

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No warranty is made by the Bureau of Land Management as to the accuracy, reliability, or completeness of these data for individual use or aggregate use with other data.

- ▭ Upper Kanab Creek Restoration Project Area-96844 Acres
- ▭ Skutumpah Restoration Project Area-32885 Acres
- 🟩 Completed Treatment Areas - 22009 Acres
- 🟪 Initiated Treatment Areas- 7775 Acres

Land Status

- 🟨 BLM
- 🟩 USFS
- 🟦 State
- 🟪 National Park Service
- ⬜ Private

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Utah Greater Sage-Grouse Adaptive Management Trigger Review

Population Area Name: **Panguitch**
Date of Review: January 13, 2017
Review Team:
Name: Ben Nadolski Agency: Utah Division of Wildlife Resources
Name: Jason Robinson Agency: Utah Division of Wildlife Resources
Name: Avery Cook Agency: Utah Division of Wildlife Resources
Name: Dave Dahlgren Agency: Utah State University
Name: Terry Messmer Agency: Utah State University
Name: John Shivik Agency: US Forest Service
Name: Ron Rodriguez Agency: US Forest Service
Name: Quincy Bahr Agency: Bureau of Land Management
Name: Jared Reese Agency: Bureau of Land Management
Name: Agency:

Population Triggers

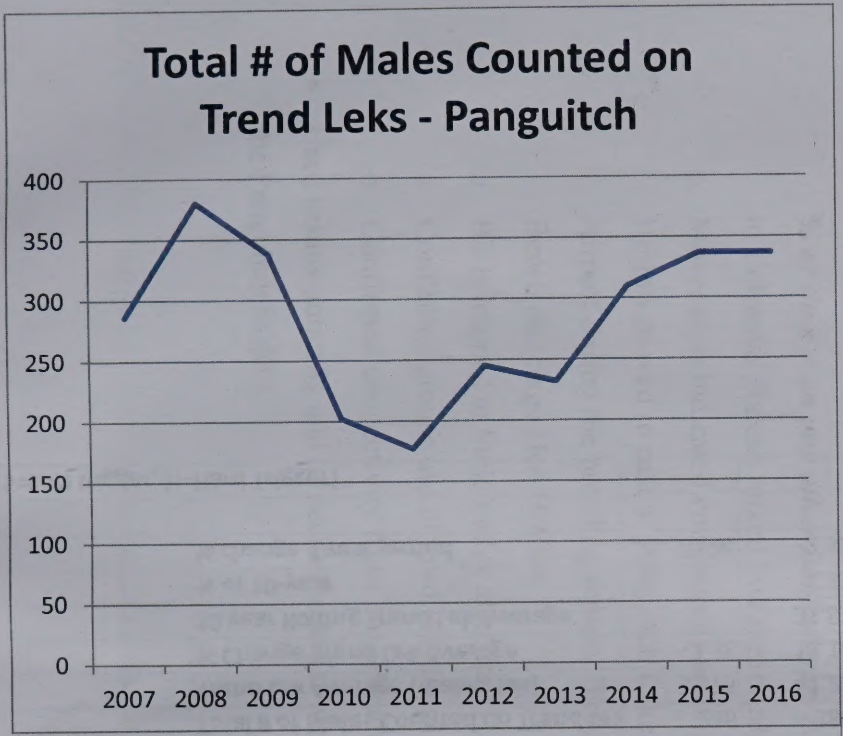
Soft Triggers	**Cells to be populated by DWR using applicable lek monitoring data.**						**Trigger Met?**
1a) 4 consecutive years of 10% or greater annual decline in average males per lek in each year, based on "trend leks"; **OR**	Year 1 (2013): **-5.31%**	Year 2 (2014): **33.62%**	Year 3 (2015): **8.71%**	Year 4 (2016): **0.00%**			**No**
1b) 6 consecutive years of declining average males per lek in each year, based on "trend leks"; **OR**	Year 1 (2011): **19.67**	Year 2 (2012): **27.22**	Year 3 (2013): **25.78**	Year 4 (2014): **34.44**	Year 5 (2015): **37.44**	Year 6 (2016): **37.44**	**No**
1c) 40% or greater decline in average males per lek in any single year, based on "trend leks"; **OR**	Year 1 (2013): **-5.31%**	Year 2 (2014): **33.62%**	Year 3 (2015): **8.71%**	Year 4 (2016): **0.00%**			**No**
1d) 50% or greater decline in average males per lek in a 4 consecutive year period, based on "trend leks"; **AND**	Year 1 (2013): **----**	Year 2 (2014): **----**	Year 3 (2015): **----**	Year 4 (2016): **45.26%**			**No**
Lambda of less than 1 in 4 consecutive years, based on all leks in the PHMA. Using criteria 1c, the 40% decline in a single year may occur at any point of the four year lambda monitoring window (year one, two, three or four).	Year 1 (2013): **0.94**	Year 2 (2014): **1.47**	Year 3 (2015): **0.96**	Year 4 (2016): **0.95**			**No**
For PHMA in the Ibapah and Hamlin Valley population areas, if a GRSG population adaptive management trigger (hard or soft) from a Nevada LUP is met on GRSG habitat in Nevada that is adjacent to the Ibapah or Hamlin Valley PHMA, a soft trigger would be met for the Utah areas, regardless of whether the above criteria have been met or not.							----

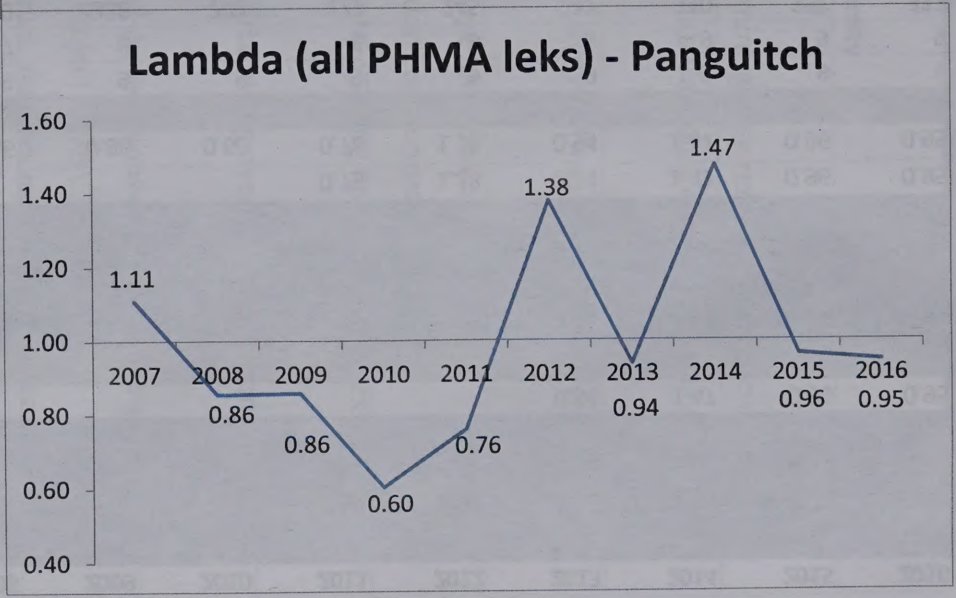
Hard Triggers	Cells to be populated by DWR using applicable lek monitoring data.									Trigger Met?
a) 4 consecutive years of 20% or greater annual decline in average males per lek in each year, based on "trend leks"; OR	Year 1 (2013): -5.31%	Year 2 (2014): 33.62%	Year 3 (2015): 8.71%	Year 4 (2016): 0.00%						No
b) average males per lek, based on trend leks, drops 75% below the 10-year rolling average males per lek in any single year (not a 75% decrease, but a decline under 75% of the 10-year rolling average); OR	10-Year Rolling Average Males Per Lek: 32.00	Average Males Per Lek: 37.44	Percent of 10-Year Rolling Average: 117.02%							No
c) Lambda of less than 1 in 6 consecutive years, based on all leks within the PHMA; OR	Year 1 (2011): 0.76	Year 2 (2012): 1.38	Year 3 (2013): 0.94	Year 4 (2014): 1.47	Year 5 (2015): 0.96	Year 6 (2016): 0.95				No
d) Lambda of less than 1 in 8 years of a 10 year window, based on all leks within the PHMA.	Year 1 (2007): 1.11	Year 2 (2008): 0.86	Year 3 (2009): 0.86	Year 4 (2010): 0.60	Year 5 (2011): 0.76	Year 6 (2012): 1.38	Year 7 (2013): 0.94	Year 8 (2014): 1.47	Year 9 (2015): 0.96	Year 10 (2016): 0.95	No

Habitat Triggers

Soft Triggers	Acres of Habitat in 2015	Current Year Acres of Habitat	% Gain/Loss	Trigger Met?
a) 10 percent loss of total GRSG habitat in PHMA; OR				
b) 10 percent loss of habitat within nesting areas in PHMA; OR	…within Nesting Areas:	…within Nesting Areas:		
c) 5 percent loss of habitat within UDWR mapped wintering areas in PHMA; OR	…within Wintering Areas:	…within Wintering Areas:		
d) any one fire that burns 5 percent of total GRSG habitat in PHMA.		Largest Single Fire:		
For PHMA in the Ibapah and Hamlin Valley population areas, if a GRSG habitat adaptive management trigger (hard or soft) from a Nevada LUP is met on GRSG habitat in Nevada that is adjacent to the Ibapah or Hamlin Valley PHMA, a soft trigger would be met for the Utah areas, regardless of whether the above criteria have been met or not.				

Hard Triggers	Acres of Habitat in 2015	Current Year Acres of Habitat	% Gain/Loss	Trigger Met?
a) 20% loss of total GRSG habitat in PHMA; OR				
b) 20% loss of habitat within nesting areas in PHMA; OR	…within Nesting Areas:	…within Nesting Areas:		
c) 20% loss of habitat within UDWR mapped wintering areas in PHMA.	…within Wintering Areas:	…within Wintering Areas:		


Total # of Males Counted on Trend Leks - Panguitch


Lambda (all PHMA leks) - Panguitch

Panguitch			2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
S.1.a	TREND	% Change in Ave Males Per Lek							-5.31	33.62	8.71	0.00
S.1.b		Averge Males Per Lek					19.67	27.22	25.78	34.44	37.44	37.44
S.1.c		% Change in Ave Males Per Lek							-5.31	33.62	8.71	0.00
S.1.d		% change 4 year period										45.26
S.2	ALL	Lambda (All PHMA Leks)							0.94	1.47	0.96	0.95
H.a	TREND	% Change in Ave Males Per Lek							-5.31	33.62	8.71	0.00
H.b.i		10 yr trend lek rolling average										32.00
H.b.ii		Trend Lek Males Per Lek										37.44
H.b.iii		% of 10 yr Rolling Ave										117.02
H.c	ALL	Lambda (All PHMA Leks)					0.76	1.38	0.94	1.47	0.96	0.95
H.d		Lambda (All PHMA Leks)	1.11	0.86	0.86	0.60	0.76	1.38	0.94	1.47	0.96	0.95
		Trend Leks Counted	8	9	9	9	9	9	9	9	9	9
		Trend Leks with Males Counted	7	7	8	7	6	8	8	9	9	9
		Total # of Males Counted on Trend Lek	286	380	338	202	177	245	232	310	337	337
		Trend Lek Average (males/lek)	35.75	42.22	37.56	22.44	19.67	27.22	25.78	34.44	37.44	37.44
		% Change Trend Lek Average	-3.38	18.10	-11.05	-40.24	-12.38	38.42	-5.31	33.62	8.71	0.00
		10 year Rolling Trend Lek Average		31.82	32.79	31.44	29.89	30.49	31.19	32.53	31.95	32.00
		% of 10-year		1.33	1.15	0.71	0.66	0.89	0.83	1.06	1.17	1.17
		% change 4 year period	70.24	-2.38	1.50	-37.22	-53.42	-27.51	14.85	75.14	37.55	45.26

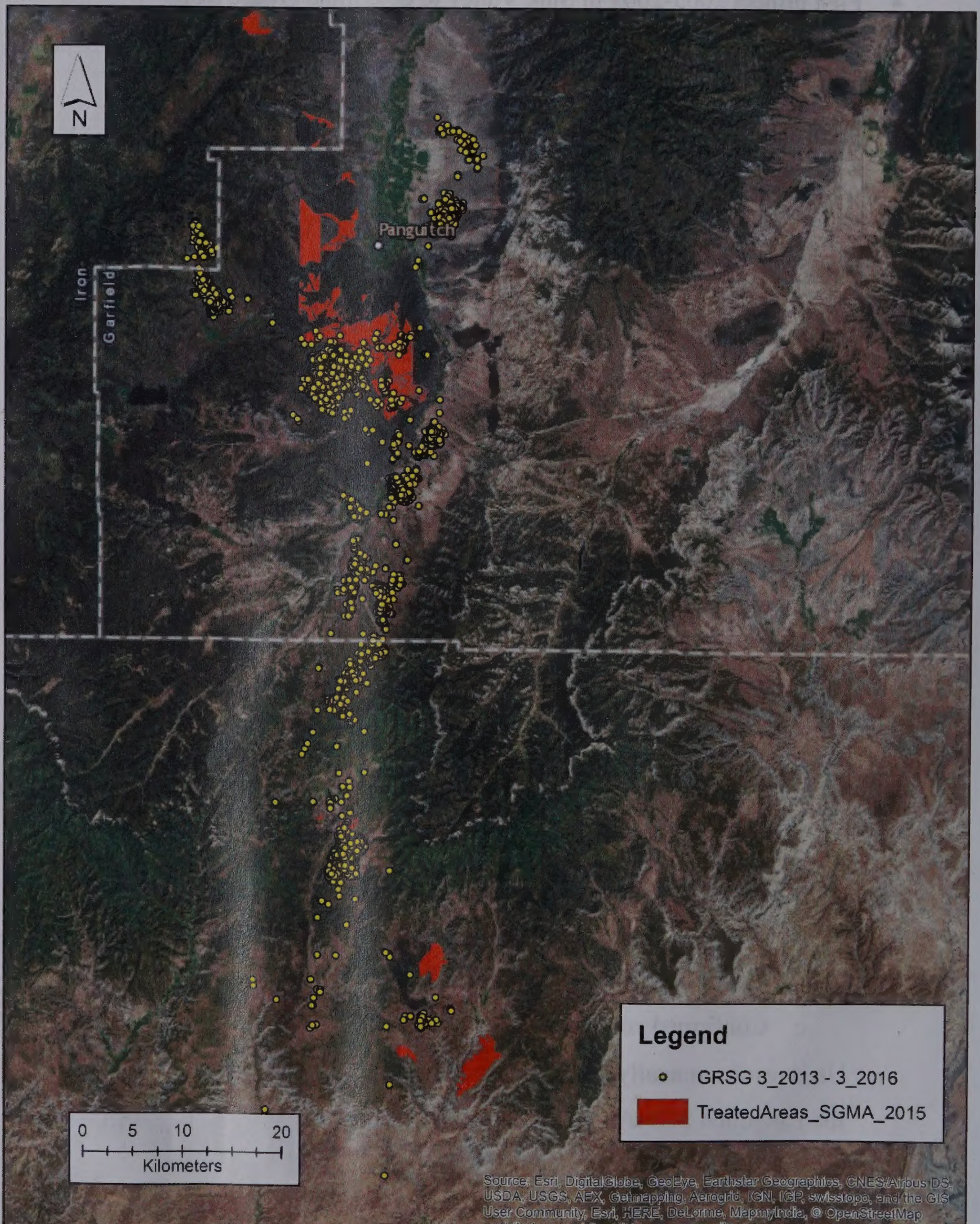
(S=soft trigger, H=Hard Trigger)

Research Supported Adaptive Resource Management

Utah State University
Dr. Nicole Frey

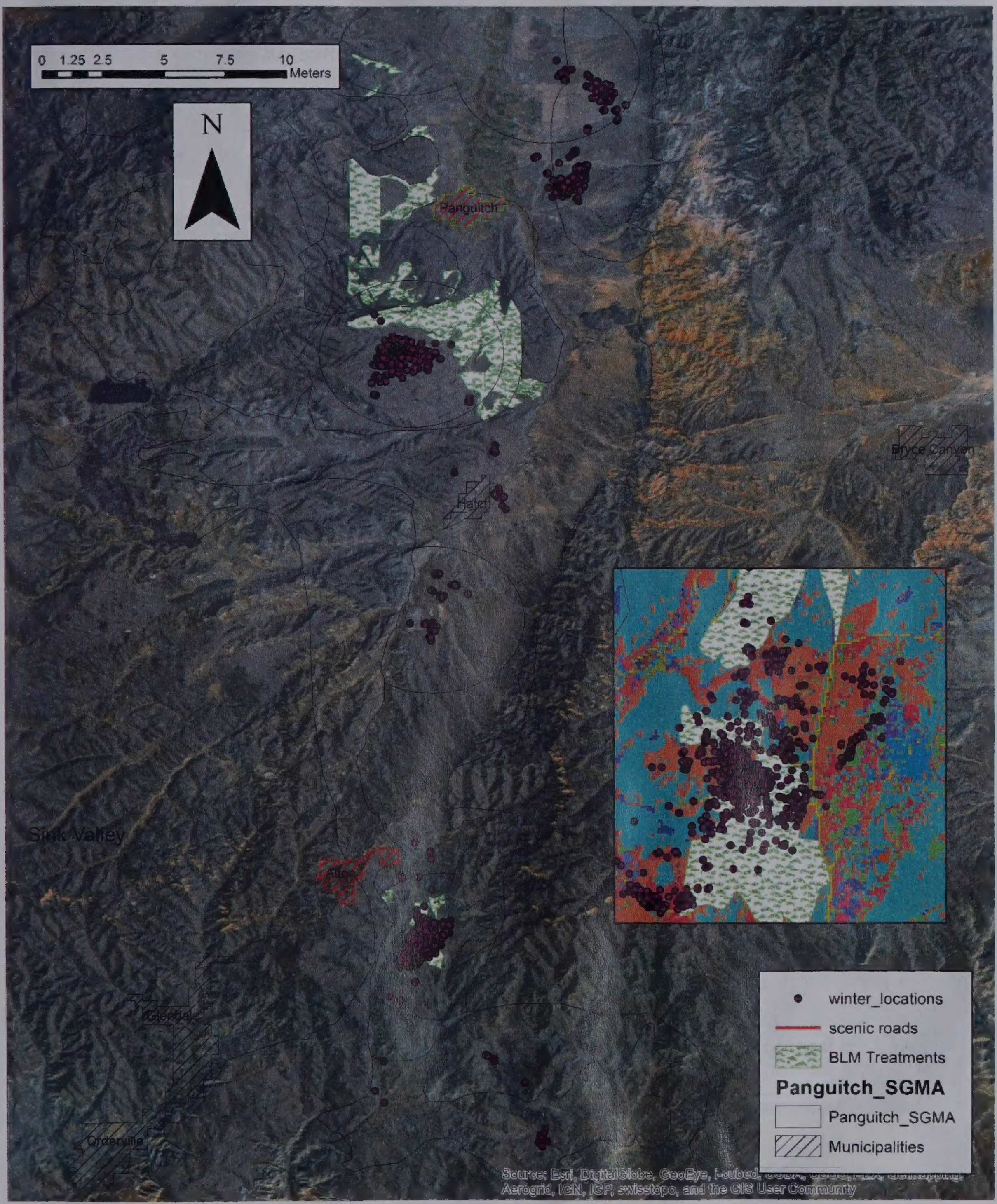
- First project 2005-2009 in Sink Valley to determine grouse response to tree removal.
- Used results to assist with project design for South Canyon, Ford Pasture and other projects with in the Upper Sevier Watershed
- In 2013, began the first satellite radio-telemetry study in Utah, in South Canyon. The objectives were:
    - Determine response of grouse to landscape level treatments
    - Determine habitat use, movement corridors and connectivity
    - Respond to the data in future treatments by opening up corridors and expanding distribution
- Monitored 12 birds from March 2013- March 2016, using over 12,000 locations for our analysis.
- Results detailed in final report "Movements and Associations of Greater Sage-grouse in the Panguitch Valley to Sink Valley Corridor. Project L19AC20537"
    - When considered across seasons and years, ***females used treated areas a greater % of time than any other habitat type***. Alternately, males were most often found in Colorado Plateau mixed low sagebrush shrubland.
    - Movements indicated connectivity among lek populations. Birds from Sage Hen Hollow moved to east of Panguitch Lake, Panguitch East Bench, and Hatch Airport during the breeding season. Birds trapped at Hoyt's Ranch used Hatch Bench and Sage Hen Hollow.
    - Birds trapped at Sink Valley also used Hoyt's Ranch.
    - Confirmed grouse use of Ford Pasture as winter habitat.
    - Confirmed connectivity from East Bench to Ford Pasture.
- Used results annually and as needed to assist with locating and designing projects within the Panguitch SGMA.

Greater sage-grouse locations in Panguitch SGMA 2013-2016



Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community, Esri, HERE, DeLorme, MapmyIndia, © OpenStreetMap contributors, and the GIS user community

Telemetry Locations November 1 2013-Feb 28 2015.
Insert depicts Sink Valley

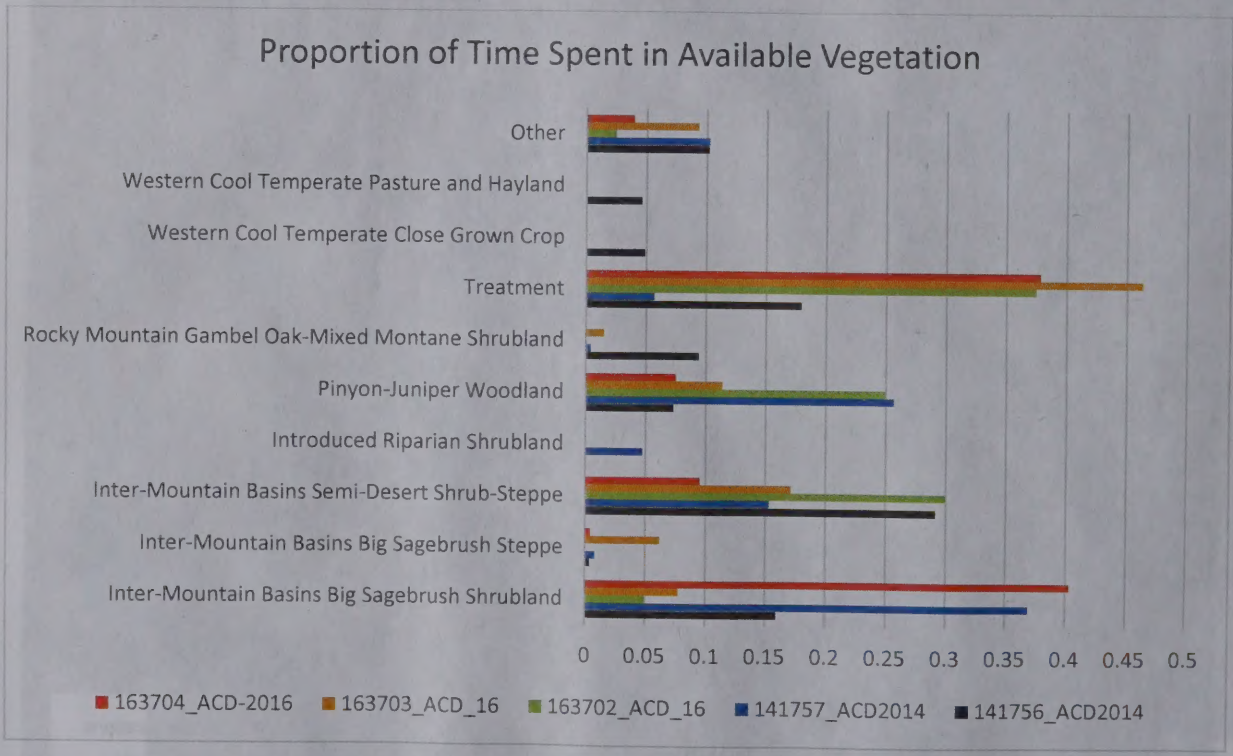


Source: Esri, DigitalGlobe, GeoEye, i-cubed, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community

Research Supported Adaptive Resource Management

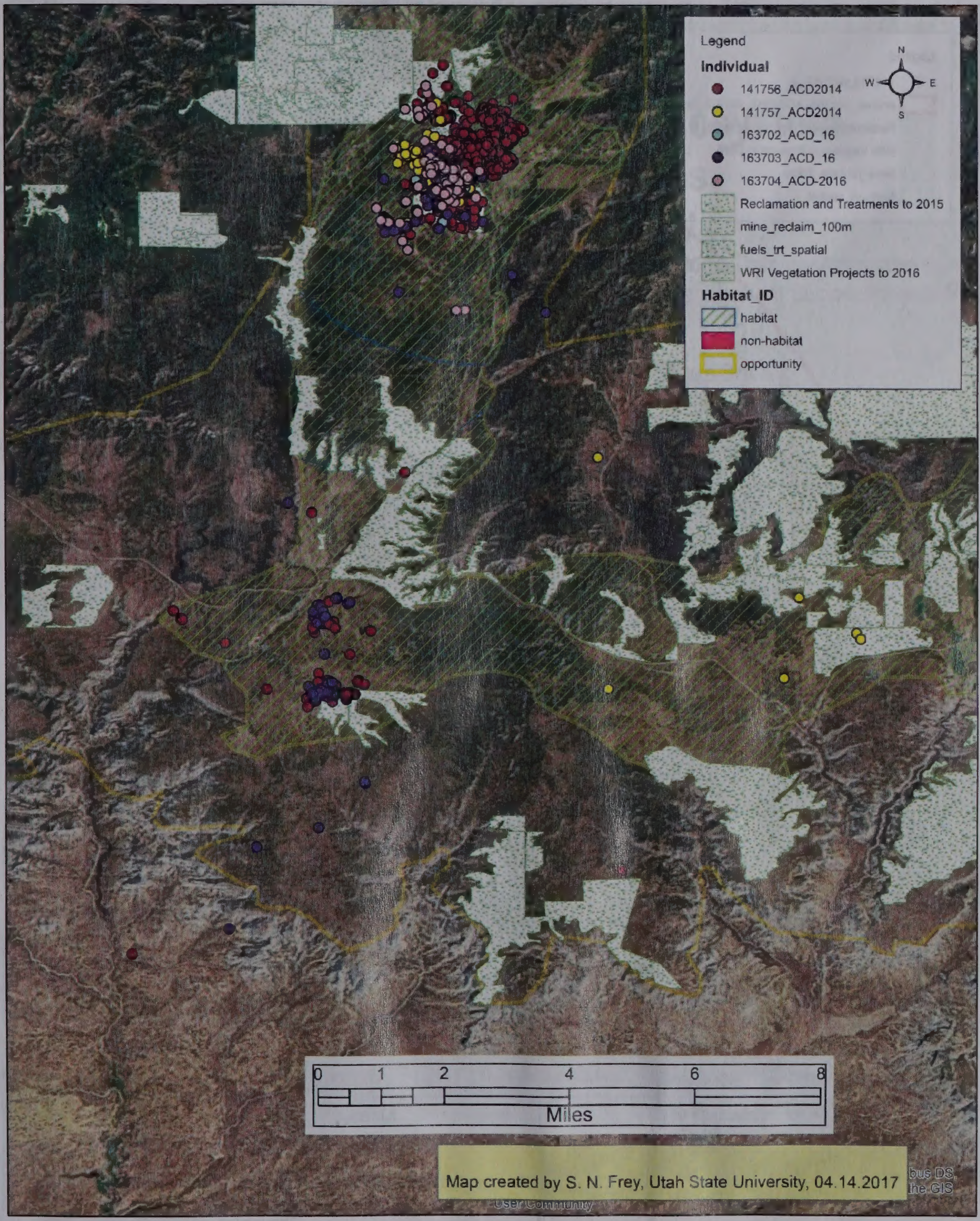
In 2014 I began monitoring birds in Sink Valley to determine the effects of the mine on Greater sage-grouse movement patterns, space use and recruitment.

- To date we have monitored 5 females and 4 males. 4 of the 5 females were young of the year when we put transmitters on them, indicating recruitment occurs in the area of the mine.
- To date, have over 5000 locations
- Grouse use treated areas extensively around the mine, particularly those created as mitigation to mining activities (Figure 3).
- Grouse do not avoid mine activity. One female has nested with 0.5 miles of the mine office for 3 years now. Last year she was successful, this year she is still on the nest.
- Treatments to increase connectivity to the south seem to be increasing N-S movement between Sink Valley and Ford Pasture.



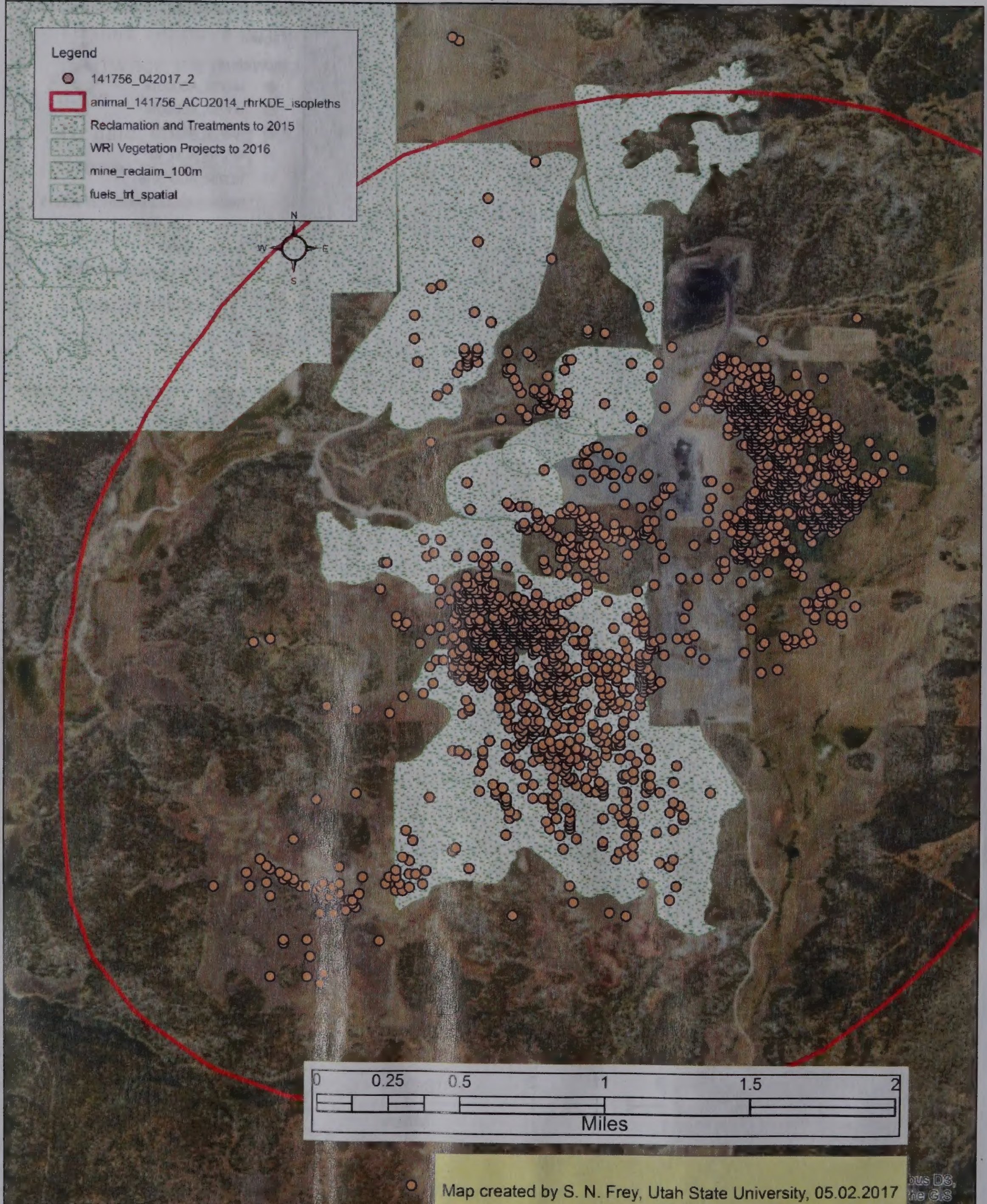
*141757ACD is a male, the others are females

Greater Sage-grouse, Alton Coal Mine LLC Vicinity
Oct 214 - April 10, 2017



Map created by S. N. Frey, Utah State University, 04.14.2017

Greater Sage-grouse 141756 (female), Alton Coal Mine LLC Vicinity
Oct 214 - April 10, 2017


Legend
● 141756_042017_2
animal_141756_ACD2014_rhrKDE_isopleths
Reclamation and Treatments to 2015
WRI Vegetation Projects to 2016
mine_reclaim_100m
fuels_trt_spatial
N
W
E
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0.25
0.5
1
1.5
2
Miles

Map created by S. N. Frey, Utah State University, 05.02.2017

USGS
science for a changing world

Estimating the Economic Impacts of Ecosystem Restoration—Methods and Case Studies

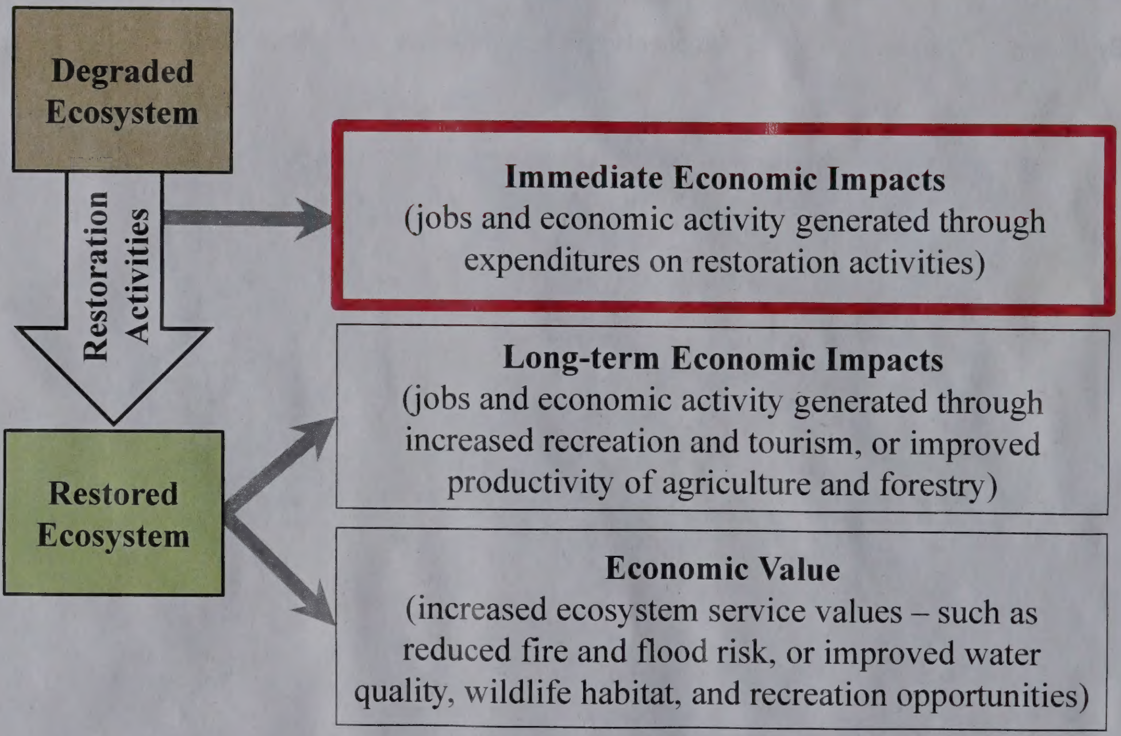
Prepared in cooperation with the U.S. Department of the Interior Natural Resource Damage Assessment and Restoration Program and Office of Policy Analysis and the Bureau of Land Management Socioeconomics Program

By Catherine Cullinane Thomas, Christopher Huber, Kristin Skrabis, and Joshua Sidon

Open-File Report 2016–1016

U.S. Department of the Interior
U.S. Geological Survey

Economic Effects of Ecosystem Restoration



Degraded Ecosystem

Restoration Activities

Restored Ecosystem

Immediate Economic Impacts
(jobs and economic activity generated through expenditures on restoration activities)

Long-term Economic Impacts
(jobs and economic activity generated through increased recreation and tourism, or improved productivity of agriculture and forestry)

Economic Value
(increased ecosystem service values – such as reduced fire and flood risk, or improved water quality, wildlife habitat, and recreation opportunities)

Excerpt From:

Estimating the Economic Impacts of Ecosystem Restoration—Methods and Case Studies. https://www.fort.usgs.gov/economic-impacts-restoration.

Characterized by vast acres of sagebrush and pinyon-juniper clad foothills, the Bureau of Land Management's (BLM's) Color Country District, located in southern Utah, is home to a variety of species, including greater sage-grouse (*Centrocercus urophasianus*), Utah prairie dog (*Cynomys parvidens*), mule deer (*Odocoileus hemionus*), antelope (*Antilocapra americana*), elk (*Cervus elaphus*), and wild horses (*Equus ferus*). These species depend on the sagebrush steppe ecosystem historically present in this region. Starting in the late 1800s with the Euroamerican settlement of the west, the sagebrush steppe ecosystem has been rapidly changing into woodlands of western juniper (*Juniperus occidentalis*) and pinyon (Blank and others, 2008). This transition from sagebrush and perennial grasses to a landscape dominated by trees has decreased the available habitat for sagebrush-dependent species such as sage-grouse and mule deer. The change to a wooded landscape has also dramatically increased fire risk, which further increases the risk of habitat loss, as well as human infrastructure loss.

The BLM and other Federal, State, and local government agencies; nongovernmental organizations; and many sportsmen and wildlife groups have teamed up to restore and manage priority ecosystems within Utah, the Colorado Plateau, and the Great Basin. Through Utah's Watershed Restoration Initiative (WRI), these organizations are partnering to pool resources and to restore healthy landscapes at a watershed scale. Through multi-phase and multi-year large-scale vegetation treatments, WRI partners are providing better wildlife habitat, restoring critical watersheds, and reducing the risk of wildfire to urban communities. To date, WRI partners have restored more than 1.1 million acres in Utah.

To restore wildlife habitat and reduce fire risk, BLM is removing pinyon and juniper trees to open wildlife travel corridors and provide firebreaks. BLM is also managing for invasive species, and seeding perennial grasses, forbs, and shrubs to reestablish sagebrush steppe vegetation. The methods used to accomplish this work include a variety of management tools, such as hand thinning, mechanical treatments, prescribed fire, herbicide treatments, and aerial seeding. By removing encroaching trees and establishing desired understory vegetation, these restoration projects maintain and enhance the long-term resilience of restored landscapes.

Removing encroaching pinyon and juniper stands to reduce wildfire risk along the wildland-urban interface. Photo credit: BLM.

Greater sage-grouse at South Canyon.
Photo credit: BLM.

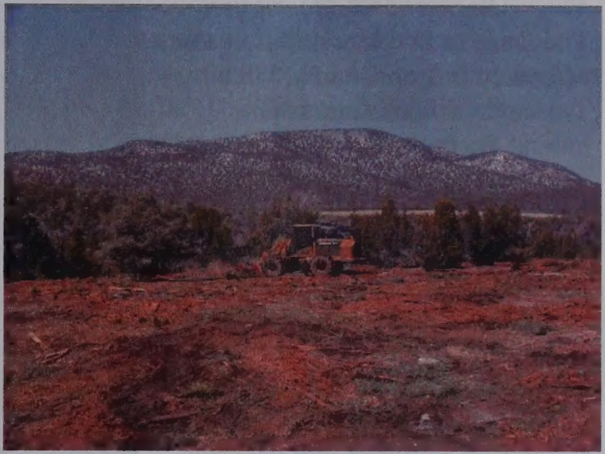
The U.S. Geological Survey collected data on restoration activities and expenditures to estimate the economic activity supported by restoration activities on four priority restoration areas in the BLM Color Country District: South Canyon, Duncan Creek, South Beaver, and Upper Kanab Creek. Based on the economic impacts estimated for these four restoration projects, it is estimated that, on average, every $1 million spent on watershed restoration in Utah generates 17.4 job-years; $1,028,000 in labor income; $1,316,000 in value added; and $2,440,000 in economic output in the Western States economy. Between 2011 and 2014, BLM spent a total of $15,730,000 (an average of $3,932,500 per year) on similar watershed restoration projects in the Color Country district. Based on the estimated average impacts per $1 million for these types of restoration projects, BLM Color Country watershed restoration projects supported an estimated 68 job-years; $4,000,000 in labor income; $5,200,000 in value added; and $9,600,000 in economic output in the Western States economy each year.

It is important to note that the economic value of these restoration projects encompasses more than the economic activity generated through project expenditures. These restoration projects also provide substantial economic values through ecosystem services that directly and indirectly affect human welfare. These projects restore and maintain important habitat for mule deer, a popular big-game species, and thus enhance wildlife-based recreation opportunities in the region. Additionally, restored sagebrush habitat is critical for the conservation of the greater sage-grouse, a species of high conservation priority. The removal of pinyon and juniper trees from the landscape also greatly reduces fire risk, thus providing additional economic value by reducing the probability of fire along the wildland-urban interface.

Background information on the BLM Color Country restoration projects was obtained from Vicki Tyler, BLM Color Country District, written commun., 2015; and from the WRI Website at https://wri.utah.gov/wri/.

South Canyon Restoration

Background information.—The South Canyon project area consists of 121,000 acres within the Upper Sevier River Watershed in southern Utah. This watershed is ranked as high priority for restoration because of degraded riparian and upland vegetation and erosion, the presence of hazardous fuels placing communities at increased risk of wildfire, and degraded greater sage-grouse (*Centrocercus urophasianus*) and mule deer (*Odocoileus hemionus*) habitat because of the expansion and infilling of pinyon and juniper. In particular, this project was designed to reestablish and maintain sagebrush semi-desert habitat, open travel corridors, and provide benefits to sage-grouse and mule deer within and immediately adjacent to the project area.



A bullhog removing pinyon and juniper trees. Photo credit: BLM.

Restoration in this area is ongoing; this case study focuses on restoration activities that occurred between 2009 and 2013. During this period, restoration was accomplished on 5,929 acres of public and private lands. The project was funded by a variety of private, State, and Federal cooperators, including the Bureau of Land Management (BLM) and the U.S. Department of Agriculture's Natural Resources Conservation Service.

Background information on the BLM Color Country South Canyon restoration project was obtained from Vicki Tyler, BLM Color Country District, written commun., 2015; and from the Watershed Restoration Initiative Website at https://wri.utah.gov/wri/.

Economic impacts.—Total expenditures for this project were $3,546,000 (2014 dollars), with an estimated 34 percent of these expenditures spent within the local economy (Beaver, Garfield, Iron, Kane, and Washington Counties in Utah). Local expenditures supported an estimated 14.7 job-years; $855,000 in labor income; $1,202,000 in value added; and $2,029,000 in economic output within the local economy. Many of the contractors that worked on the project are located outside of the local area. Including the impacts associated with all project expenditures, the South Canyon Restoration Project supported an estimated 59.8 job-years; $3,616,000 in labor income; $4,629,000 in value added; and $8,755,000 in economic output in the Western States economy.

South Canyon Restoration

Acres restored: 5,929
Total project expenditures: $3,546,000

Western States economic impacts:
- 59.8 job-years
- $3,616,000 in labor income
- $4,629,000 in value added
- $8,755,000 in economic output

Local project expenditures: $1,194,000

Local economic impacts:
- 14.7 job-years
- $855,000 in labor income
- $1,202,000 in value added
- $2,029,000 in economic output

Duncan Creek Restoration

Aerial seeding of native grasses and forbs. Photo credit: BLM.

Background information.—The Duncan Creek restoration area is located in Iron County, Utah. This area provides important habitat for mule deer (*Odocoileus hemionus*), and an increasing number of homes are located in the wildland-urban interface. Restoration efforts are focused on both habitat improvement and fire/fuels reduction.

Restoration in this area is ongoing; this case study focuses on restoration activities that occurred primarily in 2012. During this period, restoration was accomplished on 2,080 acres of public and private lands. The project was funded by a variety of private, State, and Federal cooperators, including the Bureau of Land Management (BLM), Mule Deer Foundation, National Wild Turkey Federation, and Sportsmen for Fish and Wildlife.

Background information on the BLM Color Country Duncan Creek Restoration project was obtained from Vicki Tyler, BLM Color Country District, written commun., 2015; and from the Western Restoration Initiative Website at https://wri.utah.gov/wri/.

Economic impacts.—Total expenditures for this project were $1,039,000 (2014 dollars), with an estimated 37 percent of these expenditures spent within the local economy (Beaver, Garfield, Iron, Kane, and Washington Counties in Utah). Local expenditures supported an estimated 5.0 job-years; $284,000 in labor income; $367,000 in value added; and $692,000 in economic output within the local economy. Many of the contractors that worked on the project are located outside of the local area. Including the impacts associated with all project expenditures, the Duncan Creek Restoration Project supported an estimated 18.4 job-years; $1,051,000 in labor income; $1,372,000 in value added; and $2,624,000 in economic output in the Western States economy.

Duncan Creek Restoration

Acres restored: 2,080
Total project expenditures: $1,039,000

Western States economic impacts:
- 18.4 job-years
- $1,051,000 in labor income
- $1,372,000 in value added
- $2,624,000 in economic output

Local project expenditures: $387,000

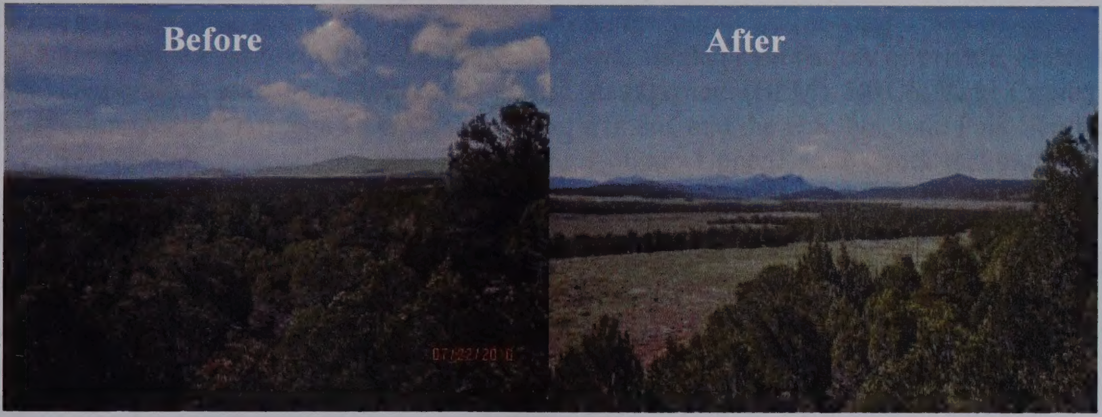
Local economic impacts:
- 5.0 job-years
- $284,000 in labor income
- $367,000 in value added
- $692,000 in economic output

South Beaver Restoration

Background information.—The South Beaver area encompasses 145,000 acres in Beaver County in southern Utah and contains public, State, and private lands. The area is crucial mule deer (*Odocoileus hemionus*) winter habitat and it contains important elk (*Cervus elaphus*) habitat and occupied sage-grouse (*Centrocercus urophasianus*) habitat (U.S. Fish and Wildlife Service, 2013). Nearby population growth and the construction of Interstate 15 have increased the importance of this area for wildlife, but encroachment of pinyon and juniper have nearly eliminated any possible use of this area by sage-grouse and greatly reduced the amount of sagebrush and other forage available for deer and elk.

Restoration in this area is ongoing; this case study focuses on restoration activities that occurred between 2006 and 2011. During this period, restoration was accomplished on 7,217 acres of public and private lands. The project was funded by a variety of private, State, and Federal cooperators, including the Bureau of Land Management (BLM); Mule Deer Foundation; Sportsmen for Fish and Wildlife; Utah Division of Forestry, Fire and State Lands; and Utah Division of Wildlife Resources.

Background information on the BLM Color Country South Beaver restoration project was obtained from Vicki Tyler, BLM Color Country District, written commun., 2015; and from the Western Restoration Initiative Website at https://wri.utah.gov/wri/.



South Beaver before and after restoration. Photo credit: BLM.

Economic impacts.—Total expenditures for this project were $3,491,000 (2014 dollars) with an estimated 72 percent of these expenditures spent within the local economy (Beaver, Garfield, Iron, Kane, and Washington Counties in Utah). Local expenditures supported an estimated 37.2 job-years; $1,993,000 in labor income; $2,536,000 in value added; and $4,243,000 in economic output within the local economy. Many of the contractors that worked on the project are located outside of the local area. Including the impacts associated with all project expenditures, the South Beaver Restoration Project supported an estimated 59.4 job-years; $3,508,000 in labor income; $4,635,000 in value added; and $7,838,000 in economic output in the Western States economy.

South Beaver Restoration

Acres restored: 7,217
Total project expenditures: $3,491,000

Western States economic impacts:
- 59.4 job-years
- $3,508,000 in labor income
- $4,635,000 in value added
- $7,838,000 in economic output

Local project expenditures: $2,505,000

Local economic impacts:
- 37.2 job-years
- $1,993,000 in labor income
- $2,536,000 in value added
- $4,243,000 in economic output

Upper Kanab Creek Restoration

Deer utilizing a treated area. Photo credit: BLM.

Background information.—The Upper Kanab Creek project area encompasses 130,000 acres in southern Utah. This project area receives national attention because it is home to the Paunsagunt mule deer herd that is prized by trophy hunters, and because it supports the southernmost population of greater sage-grouse (*Centrocercus urophasianus*) within the western United States. To provide landscape level benefits for sage-grouse, this project focused on collaboration between private landowners, the U.S. Department of Agriculture's Natural Resources Conservation Service (NRCS), and Utah's Watershed Restoration Initiative to conduct treatments that cross jurisdictional boundaries. Telemetry data show that sage-grouse are actively using older treatment areas, and newer treatments will expand both winter and brood rearing habitat near the known occupied habitat.

Restoration in this area is ongoing; this case study focuses on restoration activities that occurred between 2010 and 2013. During this period, restoration was accomplished on 3,912 acres of public and private lands. The project was funded by a variety of private, State, and Federal cooperators, including the Bureau of Land Management (BLM), NRCS, Kane County Conservation District, Arizona Game and Fish Department, and the U.S. National Park Service.

Background information on the BLM Color Country Upper Kanab Creek restoration project was obtained from Vicki Tyler, BLM Color Country District, written commun., 2015; and from the Western Restoration Initiative Website at https://wri.utah.gov/wri/.

Economic impacts.—Total expenditures for this project were $1,026,000 (2014 dollars), with an estimated 38 percent of these expenditures spent within the local economy (Beaver, Garfield, Iron, Kane, and Washington Counties in Utah). Local expenditures supported an estimated 5.0 job-years; $280,000 in labor income; $359,000 in value added; and $666,000 in economic output within the local economy. Many of the contractors that worked on the project are located outside of the local area. Including the impacts associated with all project expenditures, the Upper Kanab Creek restoration project supported an estimated 18.1 job-years; $1,103,000 in labor income; $1,344,000 in value added; and $2,587,000 in economic output in the Western States economy.

Upper Kanab Creek Restoration

Acres restored: 3,912
Total project expenditures: $1,026,000

Western States economic impacts:
- 18.1 job-years
- $1,103,000 in labor income
- $1,344,000 in value added
- $2,587,000 in economic output

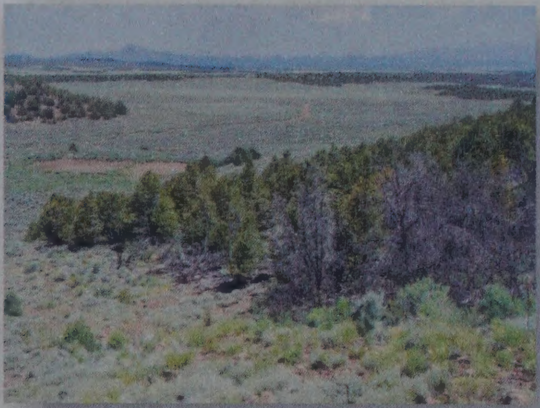
Local project expenditures: $391,000

Local economic impacts:
- 5.0 job-years
- $280,000 in labor income
- $359,000 in value added
- $666,000 in economic output

South Canyon Vegetation Enhancement

Introduction

South Canyon Vegetation Enhancement Project area consists of six sub-watersheds within the Pass Creek and Panguitch Creek watersheds. Of particular concern within the project area is the expansion and infilling of pinyon and juniper trees into areas once dominated by shrubs and herbaceous vegetation such as perennial grasses and forbs. The expansion and infilling of pinyon and juniper affects soil resources, water and nutrient cycles, fire regimes, fuel loading, plant community structure and composition, forage production and wildlife habitat.

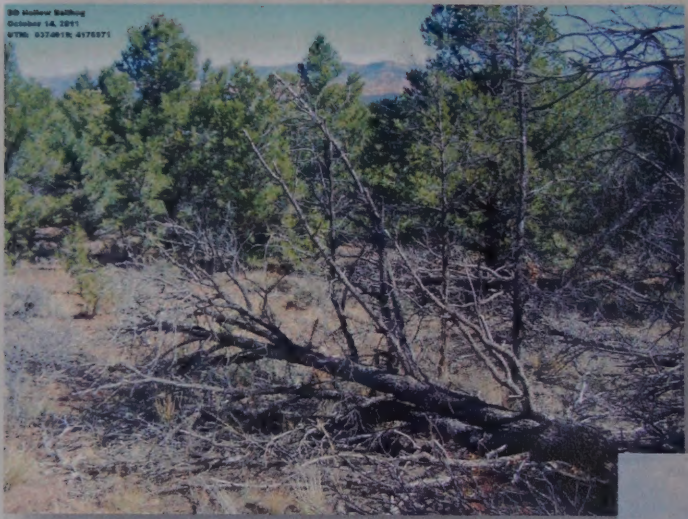


Objectives

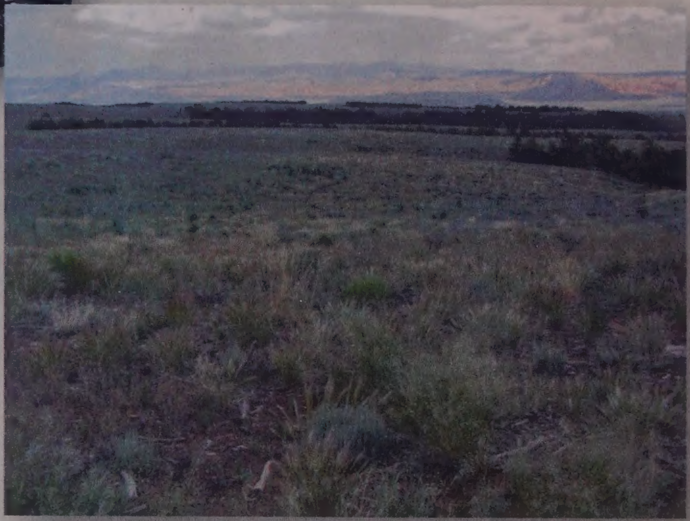
- Maintain and improve vegetative diversity and age class structure by reintroducing healthy, viable perennial grasses, forbs and shrubs on approximately 28,000 acres.
- Re-establish and maintain diverse sagebrush semi-desert habitat.
- Improve sage grouse habitat by opening travel corridors, reducing encroaching pinyon and juniper and seeding perennial grasses, forbs and shrubs.
- Reduce the risk of catastrophic wildfire by decreasing the impact of wildfire to the communities and outlying residential properties of Panguitch, Hillsdale and Hatch, UT.
- Reduce sedimentation through erosion into the Sevier River.

Seed mix

Species	Lbs/acre
Indian Ricegrass	2.5
Snake River Wheatgrass	1.5
Great Basin Wildrye	1.5
Crested Wheatgrass	1.0
Pubescent Wheatgrass	1.0
Russian Wildrye	1.0
sandberg Bluegrass	0.5
Small Burnet	1.0
Alfalfa	1.0
Sanfoin	1.0
Flax	1.0
Palmer Penstemon	0.5
Lbs/acre	**13.5**



Before Treatment (2011)



After Treatment (2014)

Treatment Project Acres to Dates

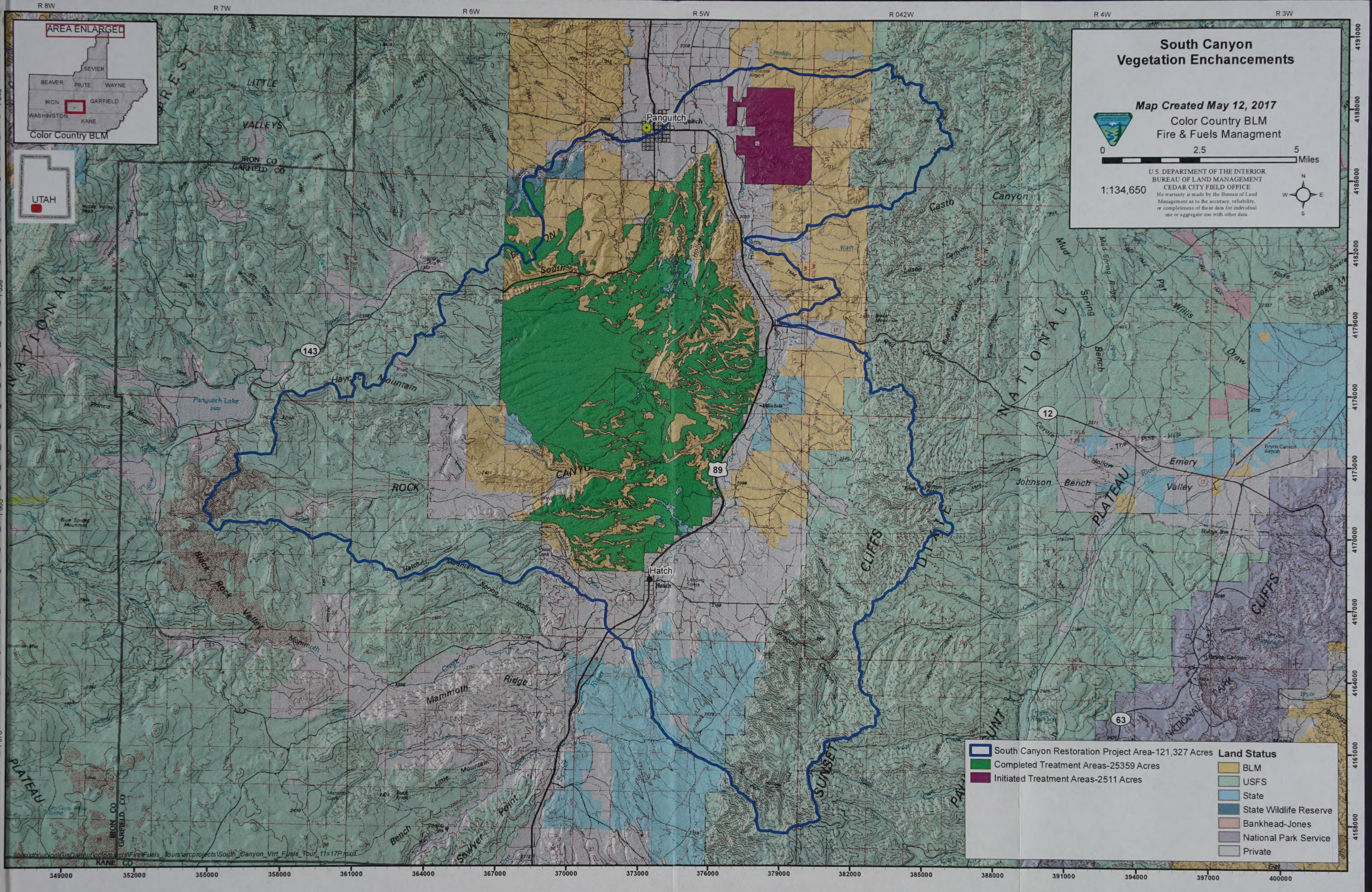
Year	Project	Treatment	Acres
2010	South Canyon	Bullhog/Seeding	1,749
2011	South Canyon (DD Hollow)	Bullhog/Seeding	1,901
2012	South Canyon (Hillsdale)	Bullhog/Seeding	2,279
2013	South Canyon (Graveyard)	Bullhog/Seeding	1,485
2014	South Canyon (Rock Canyon)	Bullhog/Seeding	1,971
2014	South Canyon (Sagehen)	Hand Thinning	5,475
2015	South Canyon (Limestone)	Bullhog/Seeding	2,227
2015	South Canyon Lop and Scatter	Hand Thinning	2,157
2016	South Canyon (Coal Pits Wash)	Bullhog/Seeding	1,200
2016	South Canyon Lop and Scatter	Hand Thinning	1,129
2017	South Canyon (Roller Mill)*	Chaining	2,500
Total			**24,073**

*Project will be completed fall of 2017

South Canyon
Vegetation Enchancements

Map Created May 12, 2017

Color Country BLM
Fire & Fuels Managment



U.S. DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT
CEDAR CITY FIELD OFFICE

No warranty is made by the Bureau of Land Management as to the accuracy, reliability, or completeness of these data for individual use or aggregate use with other data

☐ South Canyon Restoration Project Area-121,327 Acres
🟩 Completed Treatment Areas-25359 Acres
🟪 Initiated Treatment Areas-2511 Acres

Land Status
🟨 BLM
🟩 USFS
🟦 State
🟦 State Wildlife Reserve
🟥 Bankhead-Jones
🟪 National Park Service
⬜ Private

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Utah Juniper and Pinyon Pine Growth and Competition

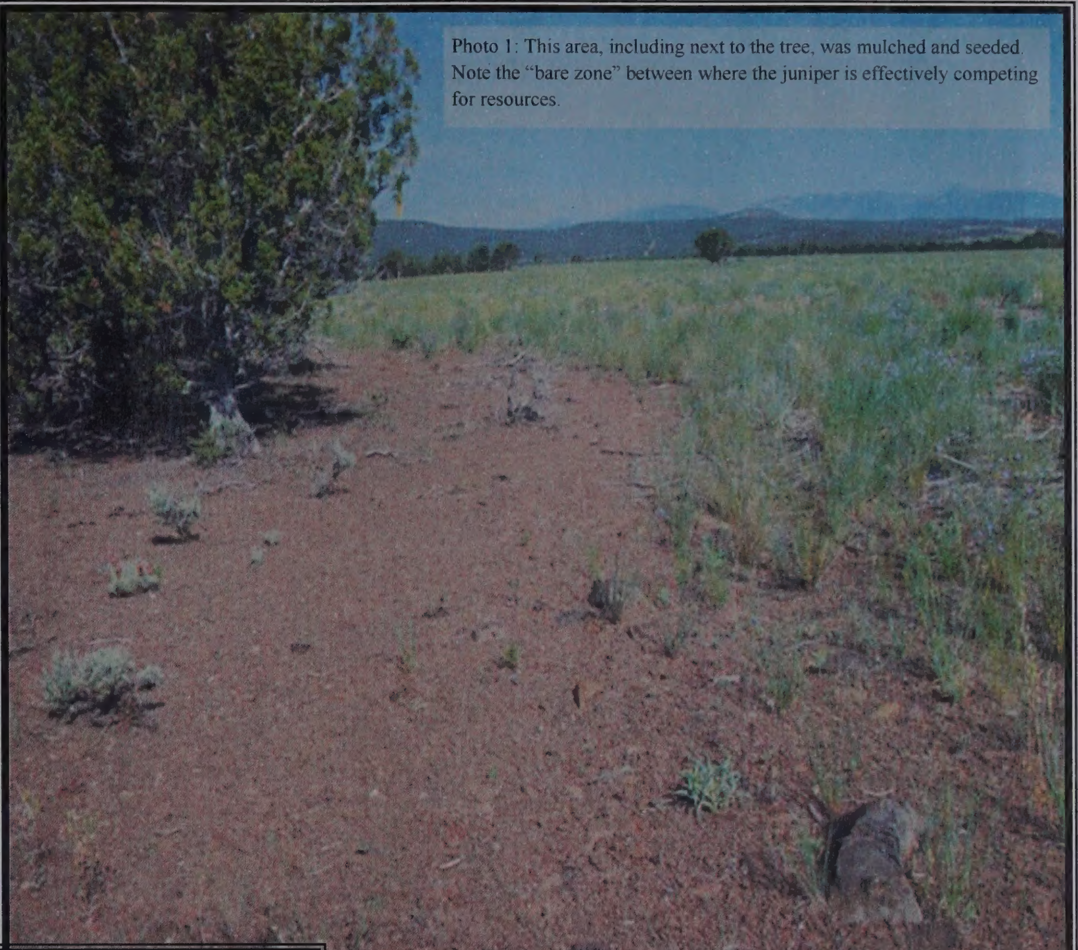


Photo 1: This area, including next to the tree, was mulched and seeded. Note the "bare zone" between where the juniper is effectively competing for resources.

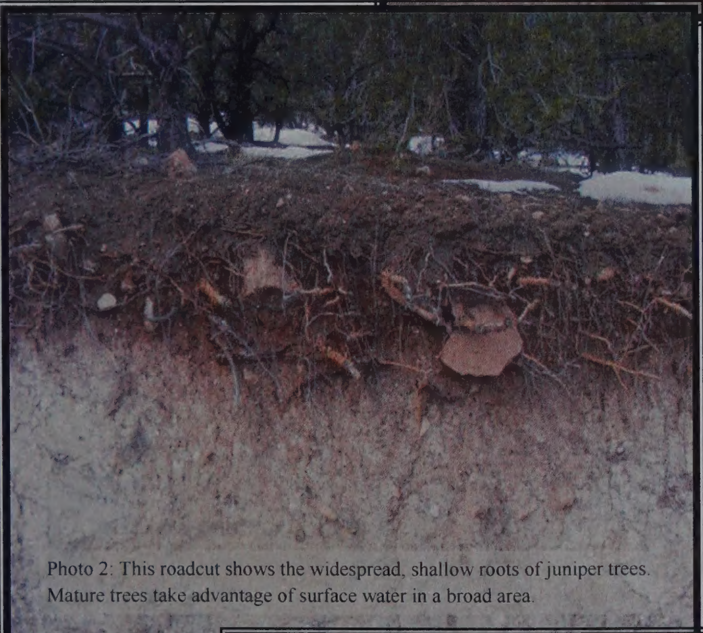
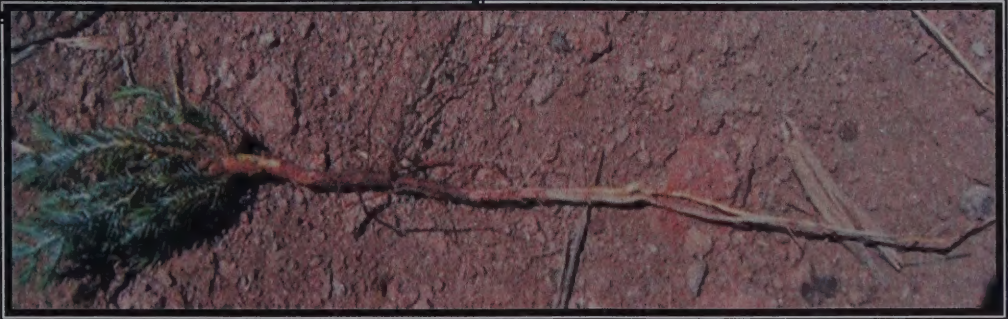
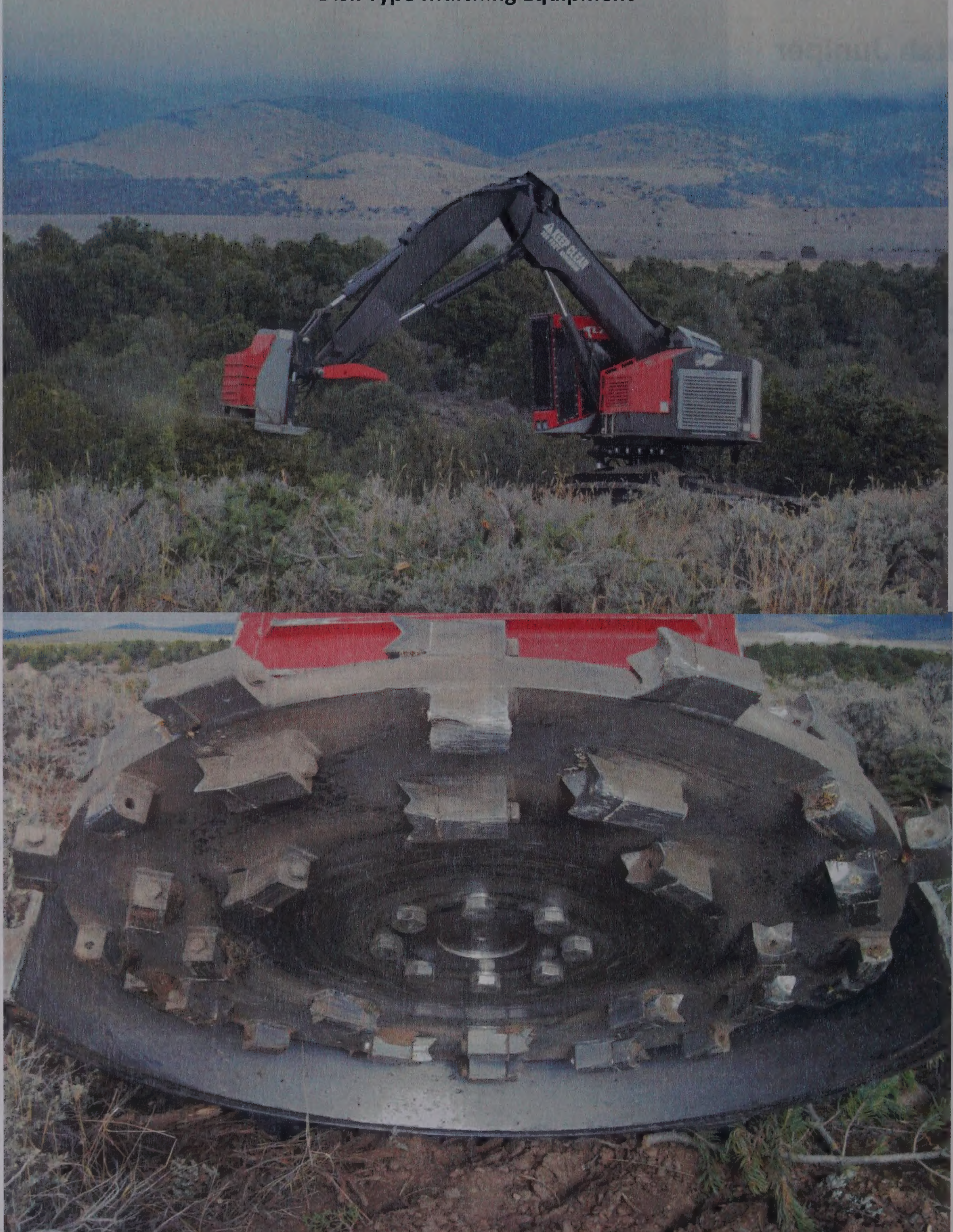


Photo 2: This roadcut shows the widespread, shallow roots of juniper trees. Mature trees take advantage of surface water in a broad area.

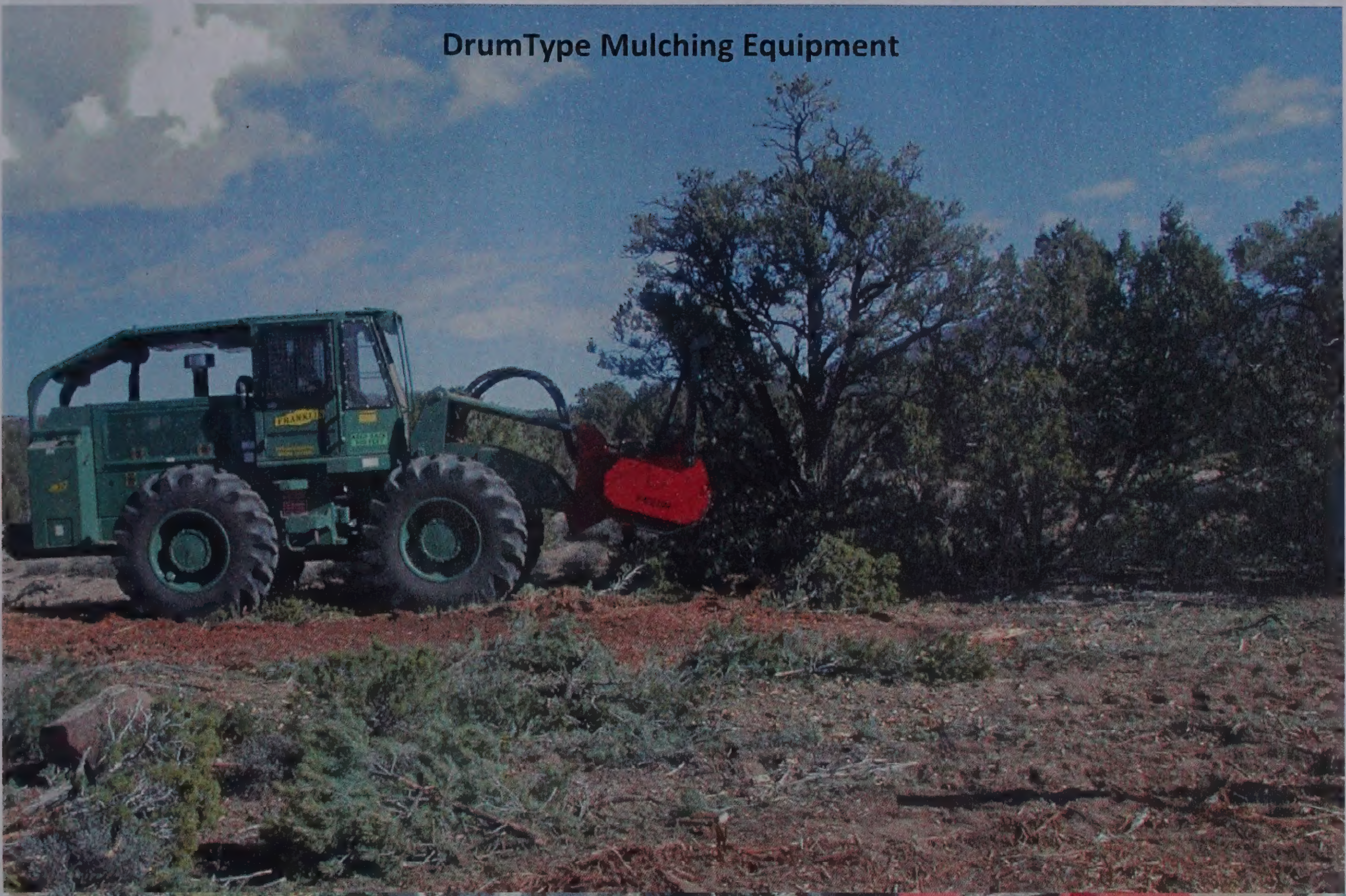
Miller, et. al. (2005) has shown that during the first 10 years juniper trees direct most of their energy on developing a long taproot and subsequent lateral root development, with minimum above ground growth (<15 inches). During the second 10 year period they can add 3-to-6 inches of above ground growth per year, which means they add 3 to 5 feet during that second decade! This would imply that competition with nutrients/etc., begins early and may be greatest during the first 10 years, as root systems develop; At year 10, pinyon and juniper may well be on their way to outcompeting surrounding vegetation, despite the fact that these trees are relatively small.

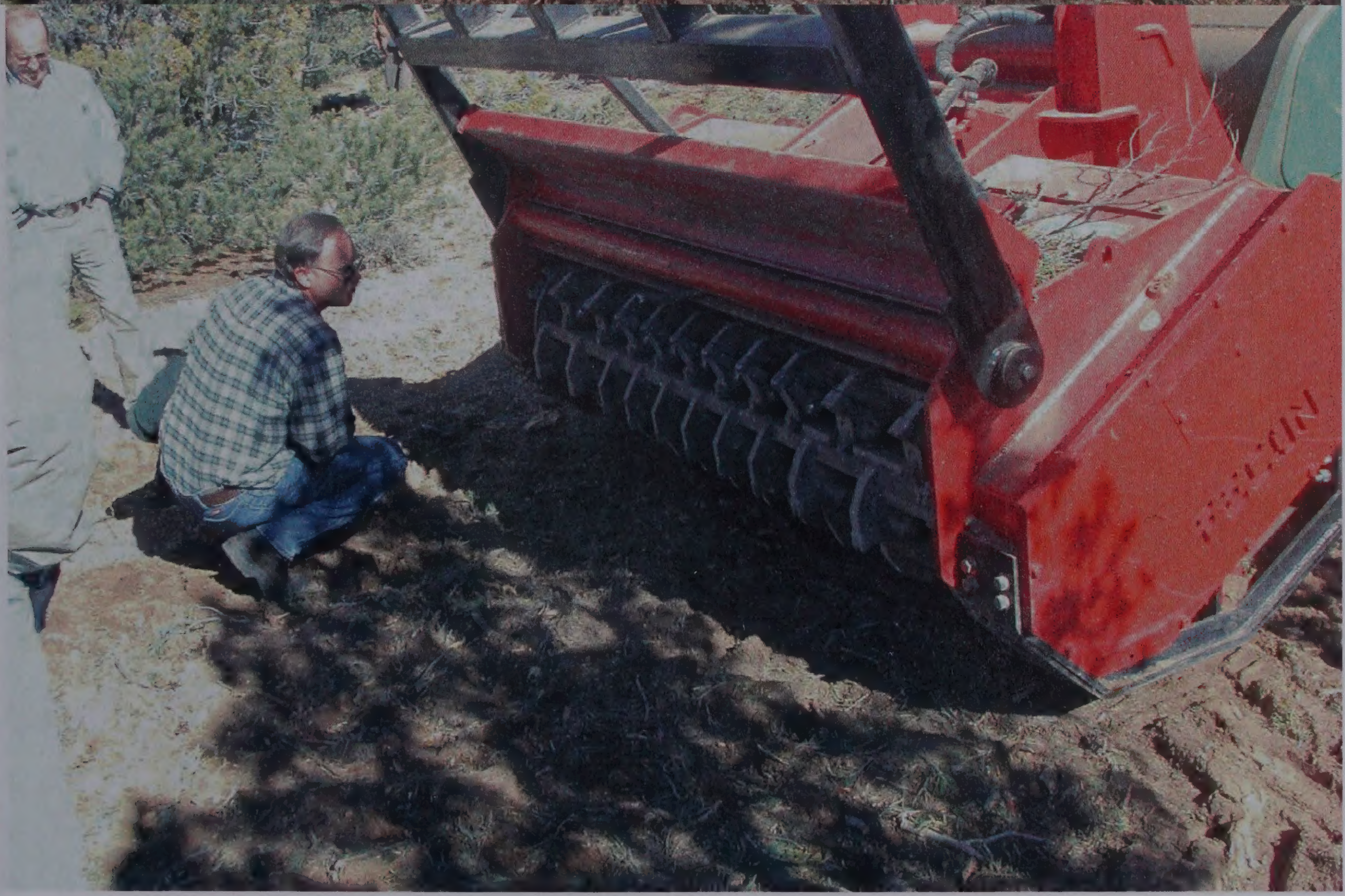


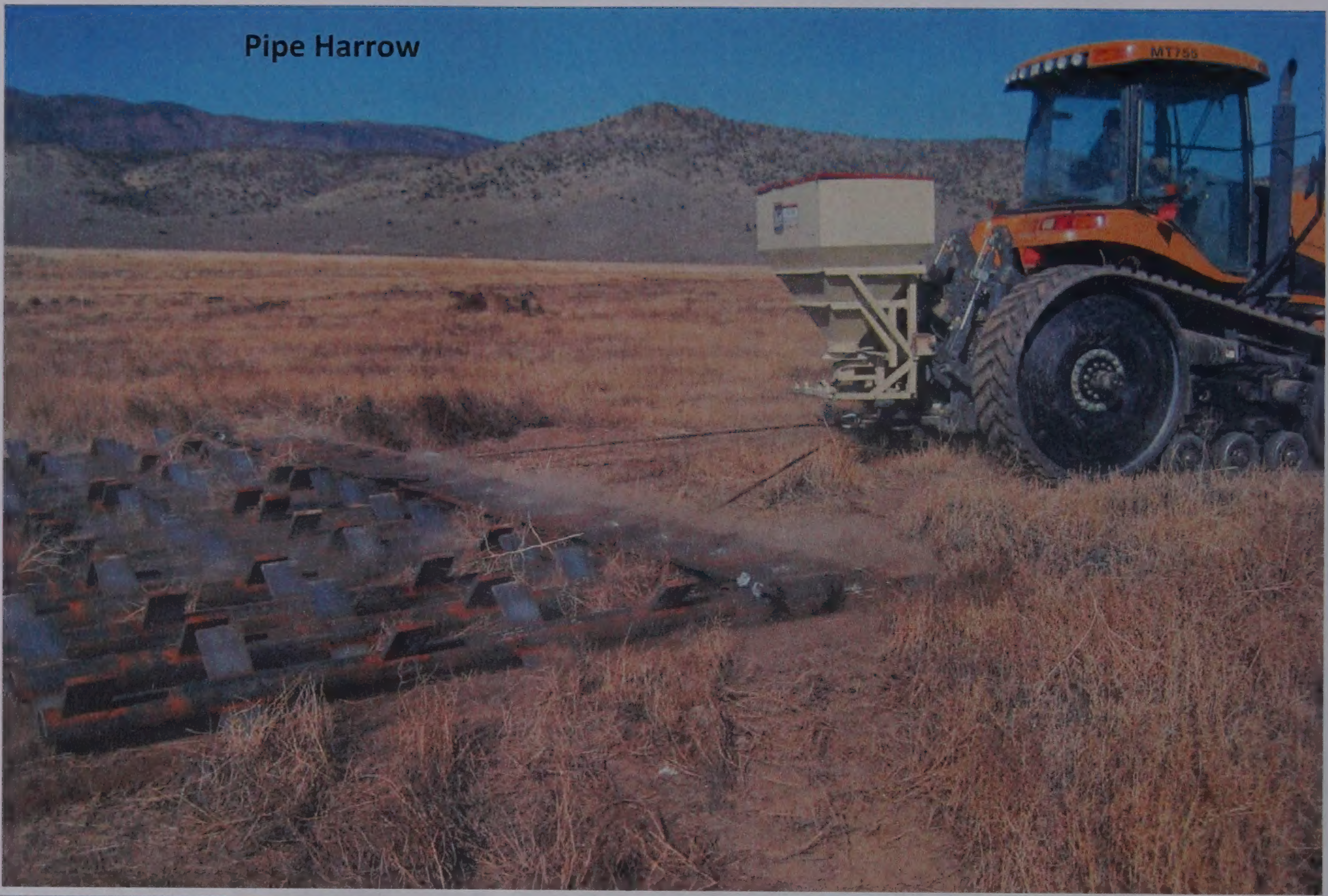
Disk Type Mulching Equipment

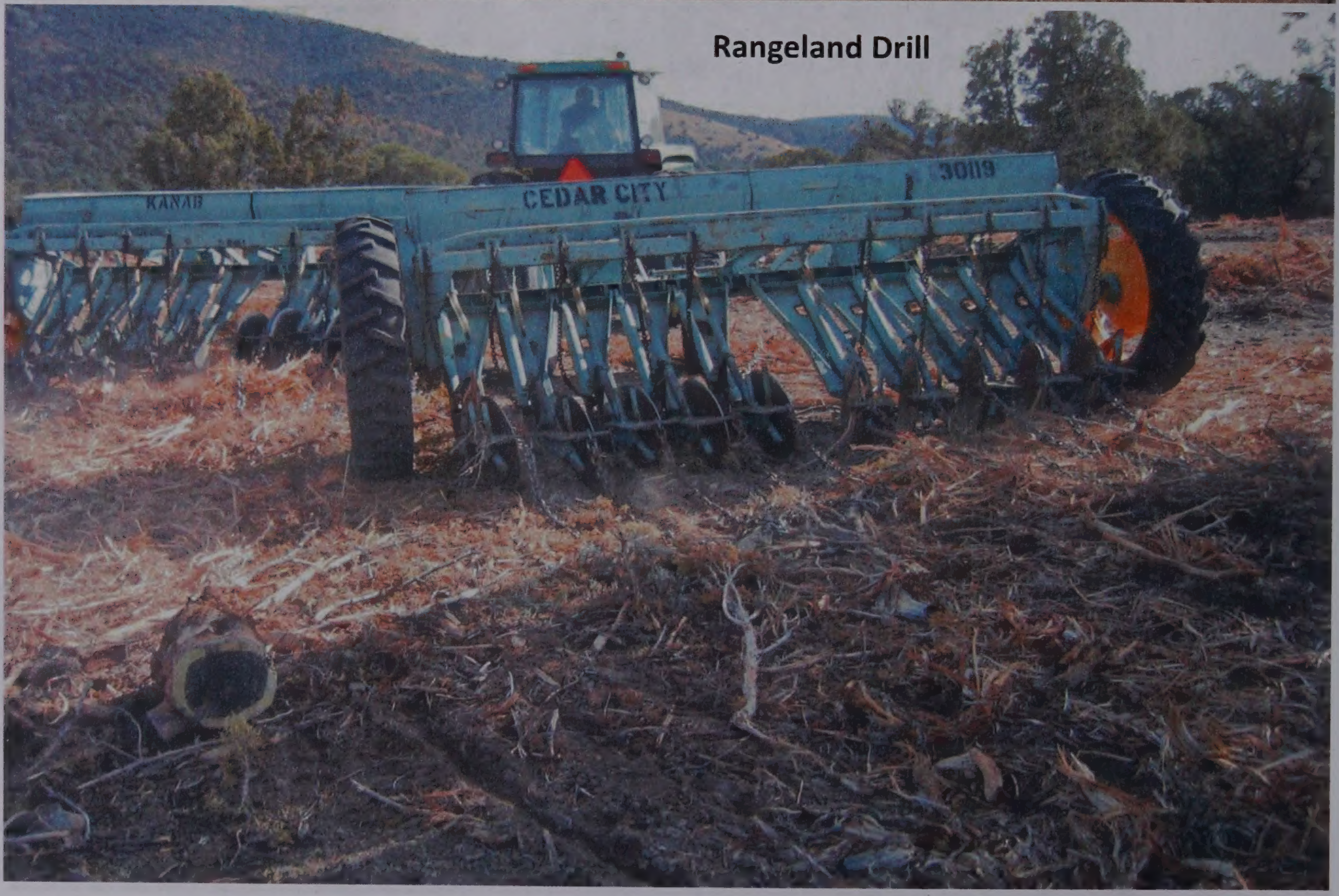


DrumType Mulching Equipment



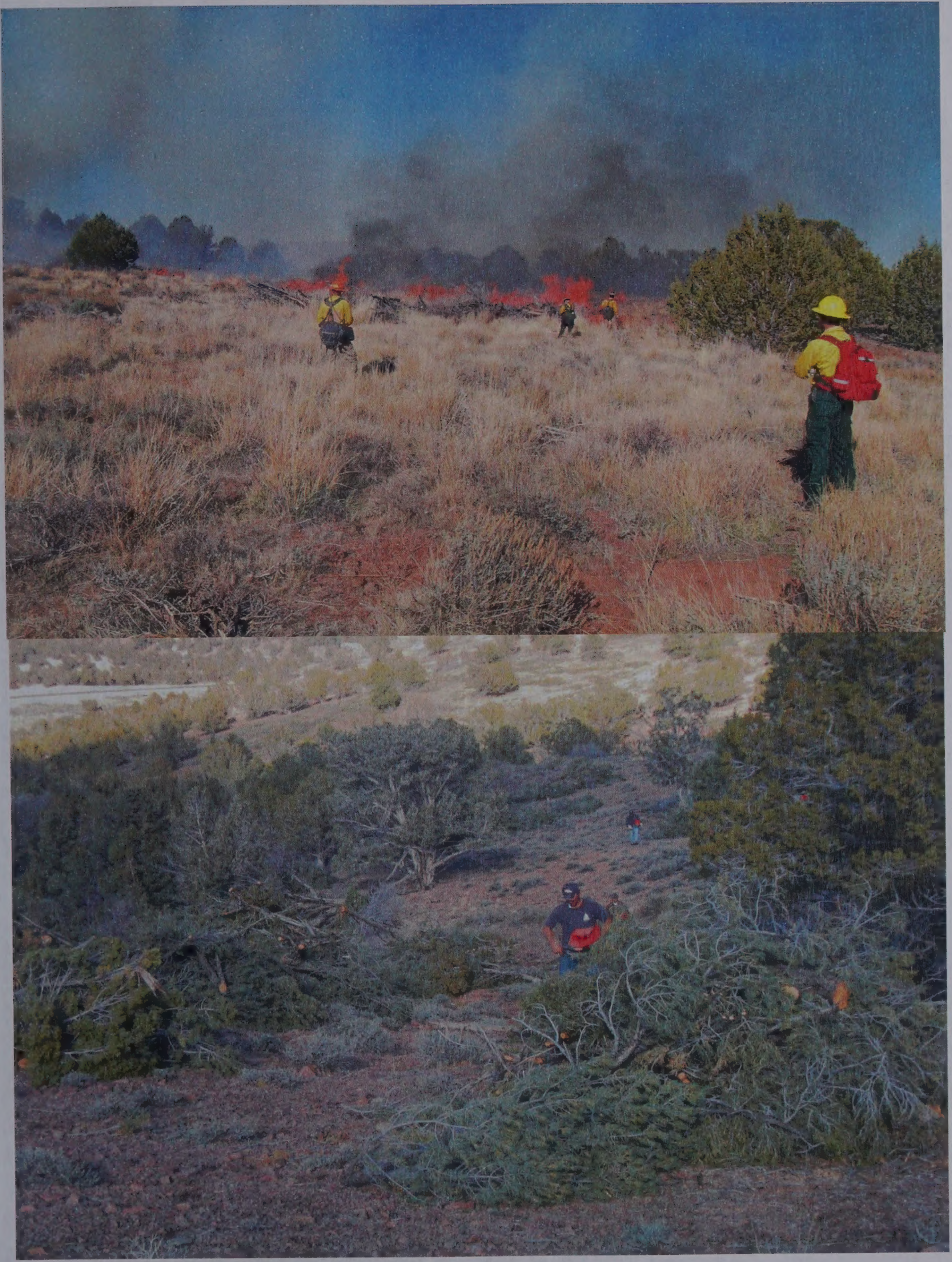


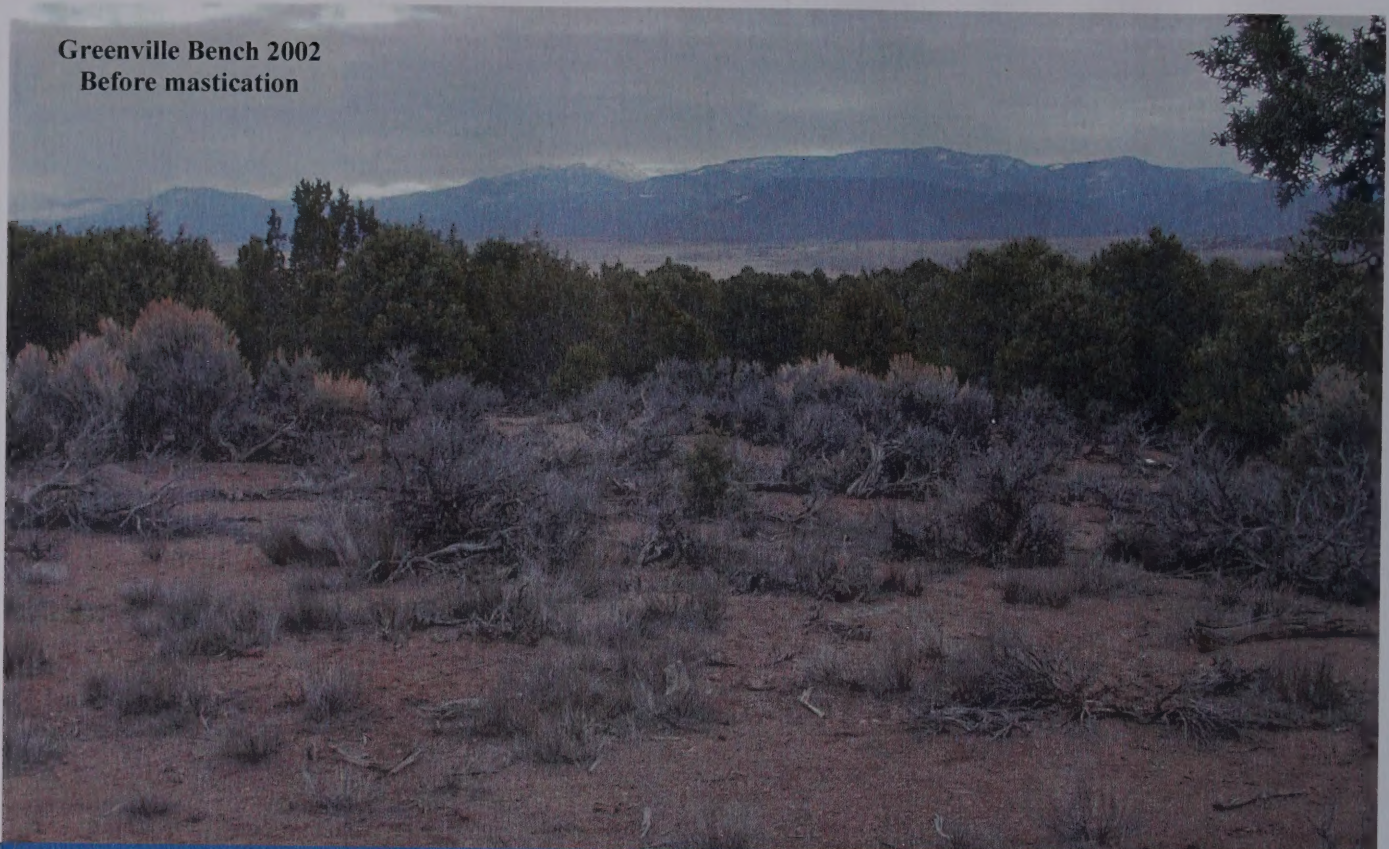

Pipe Harrow


Rangeland Drill

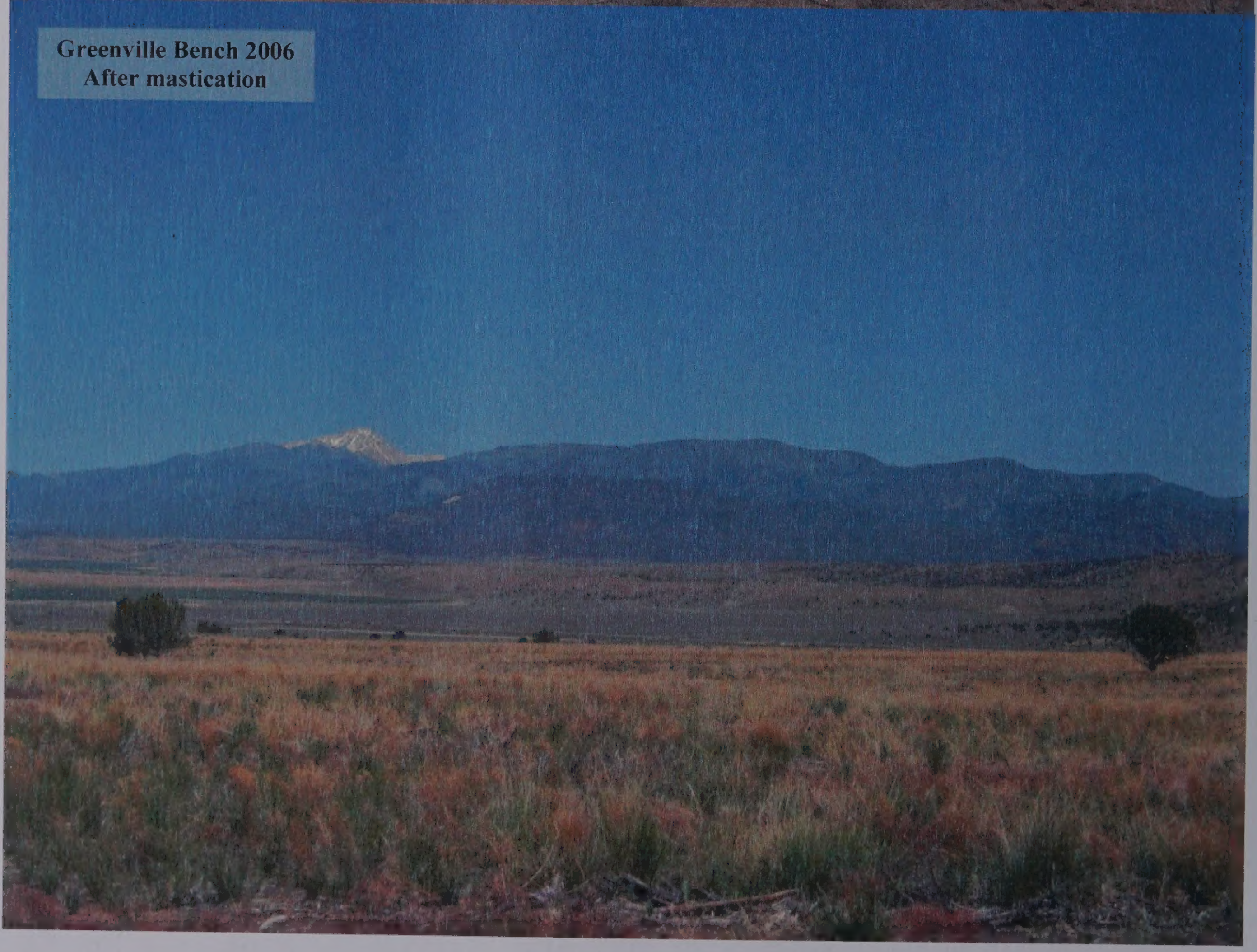
Aerial Seeding

Cummins
Power
www.timber

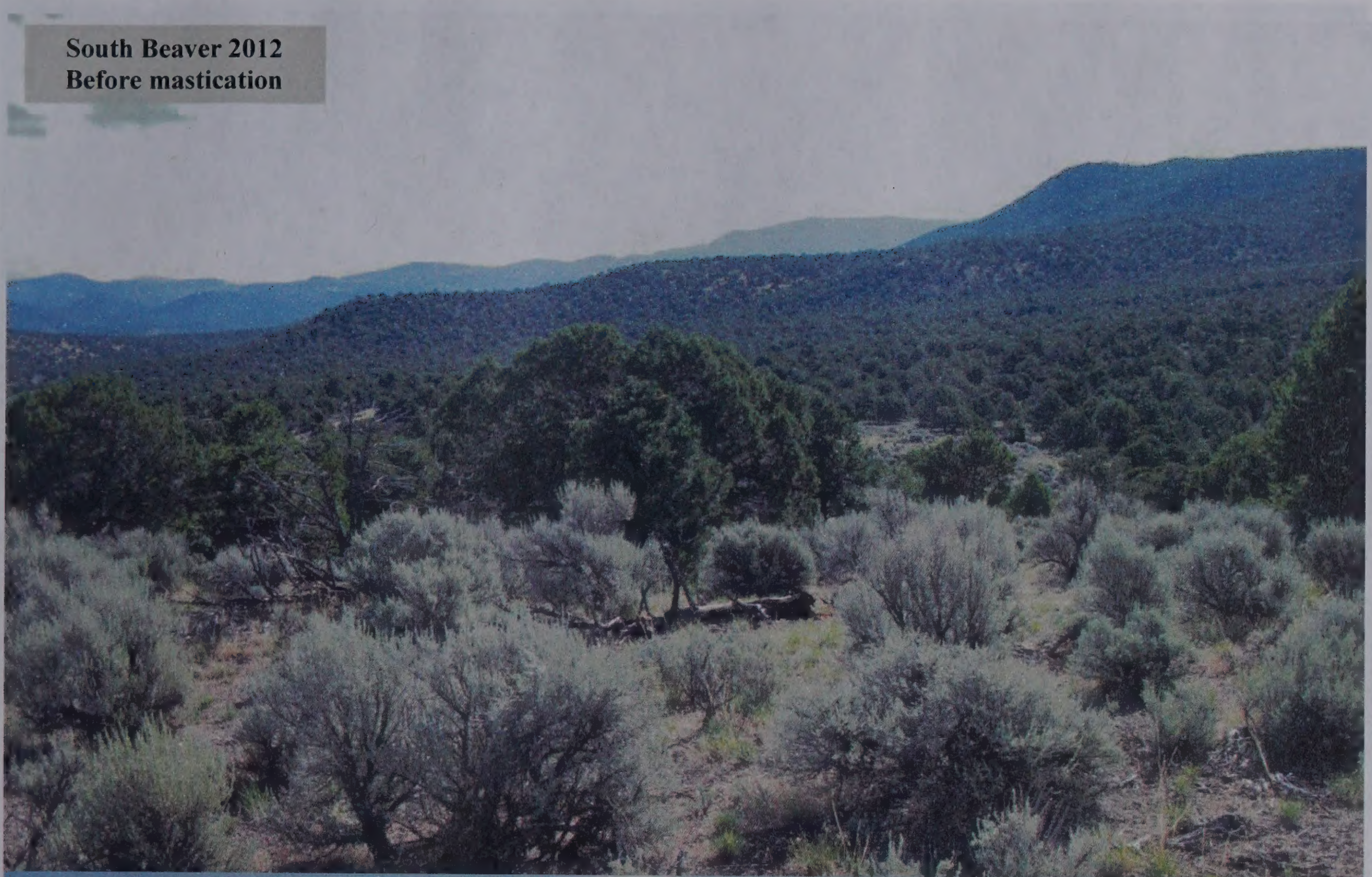




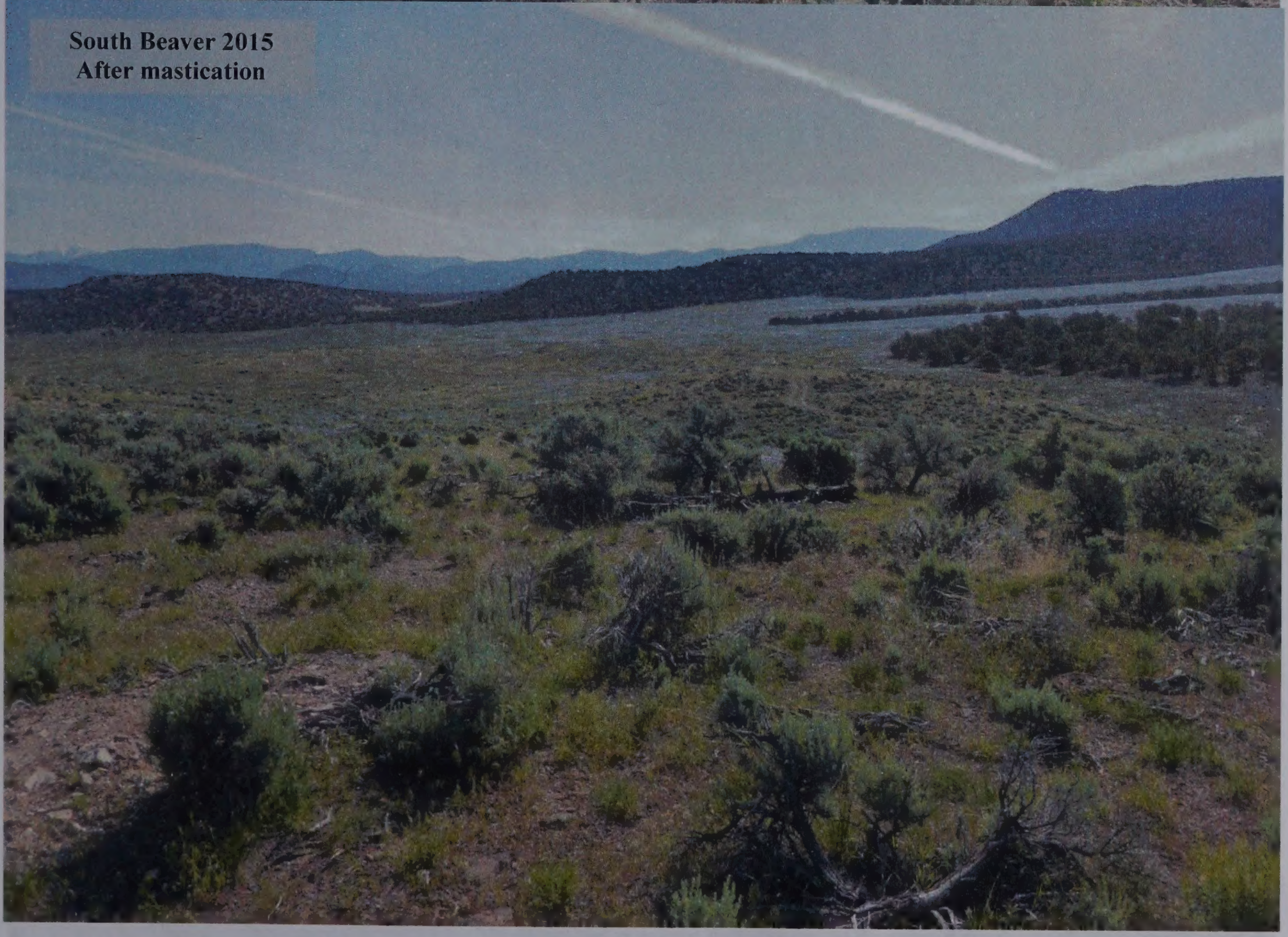
Greenville Bench 2002
Before mastication



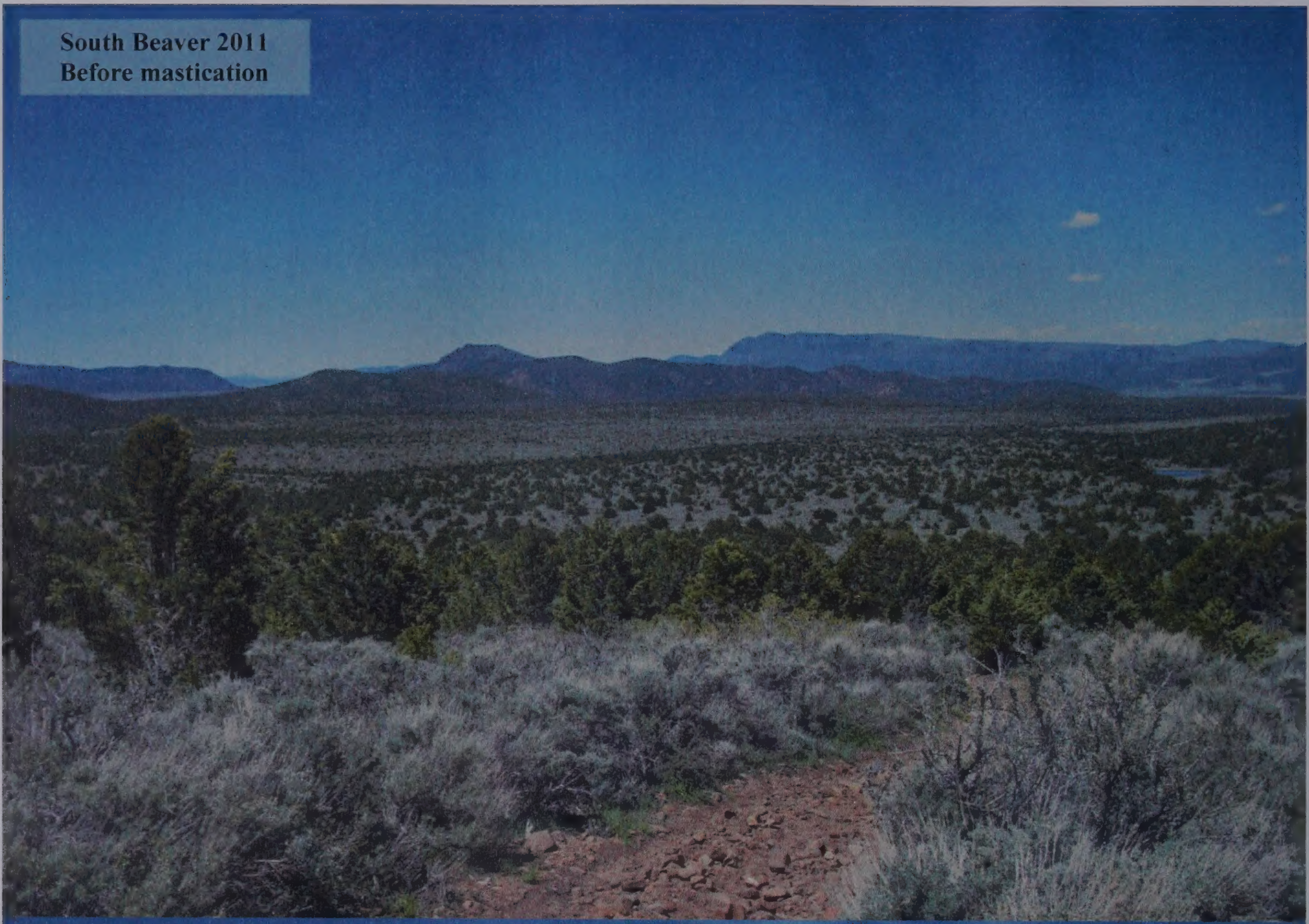
Greenville Bench 2006
After mastication

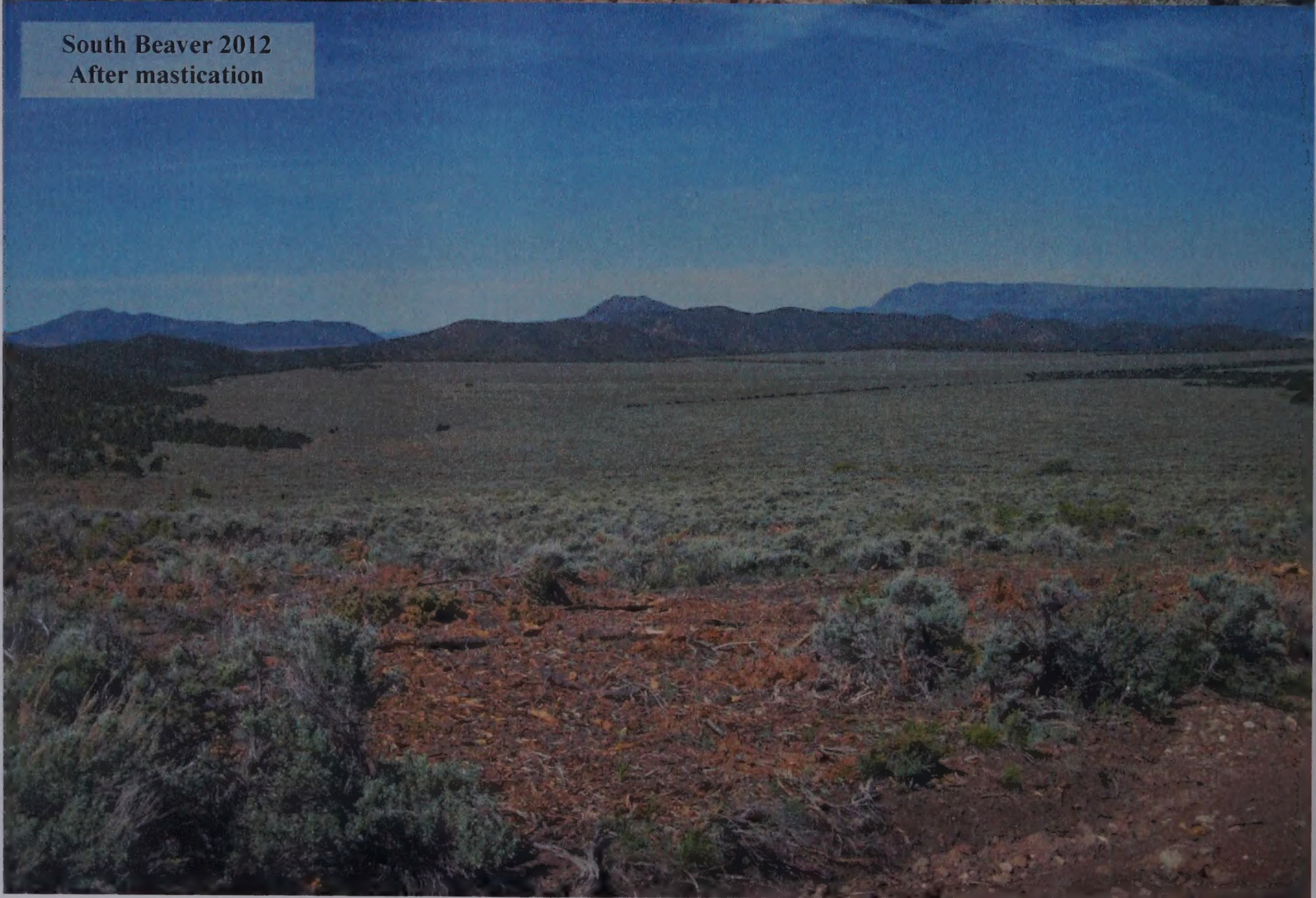


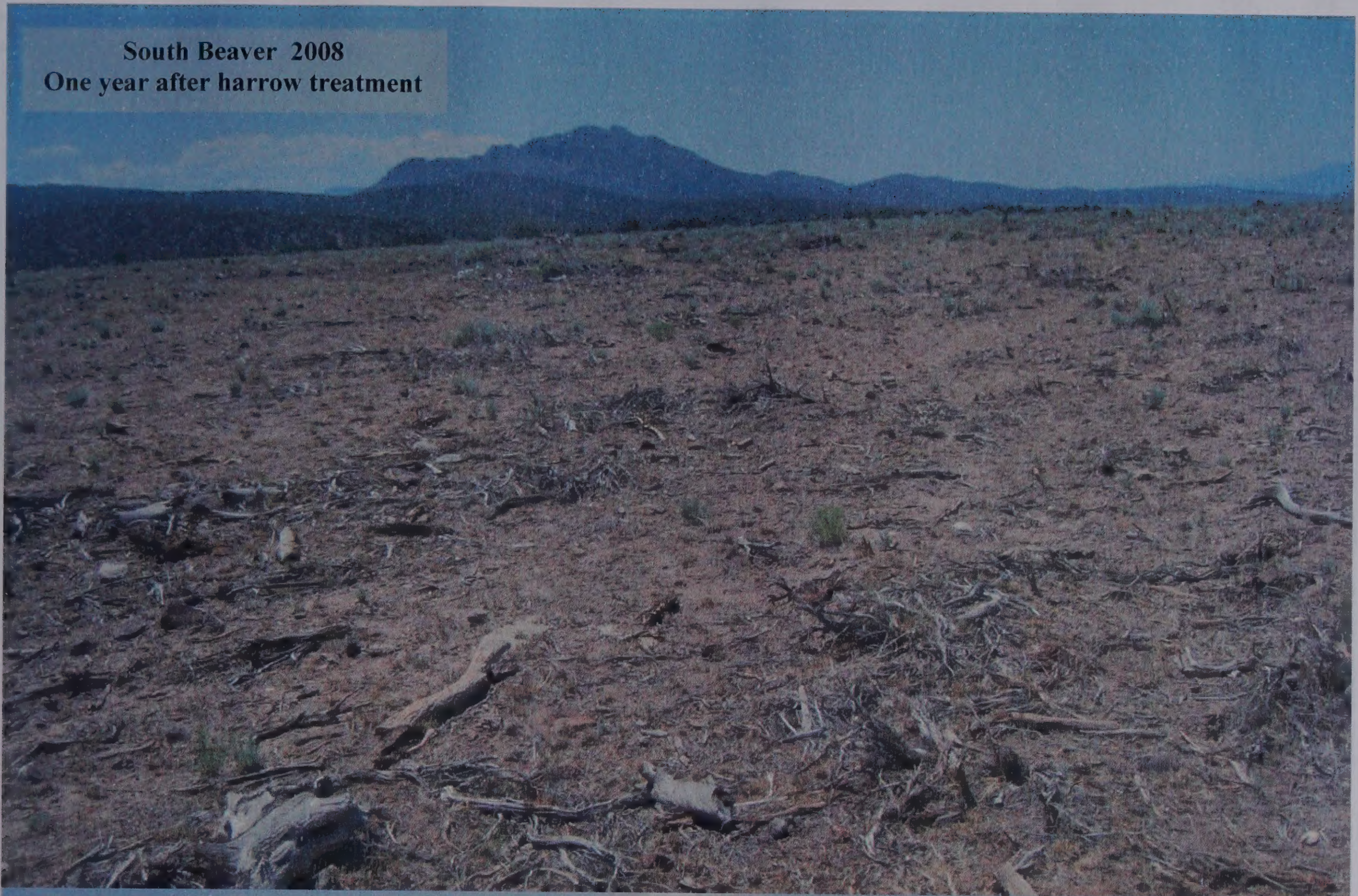
South Beaver 2012
Before mastication



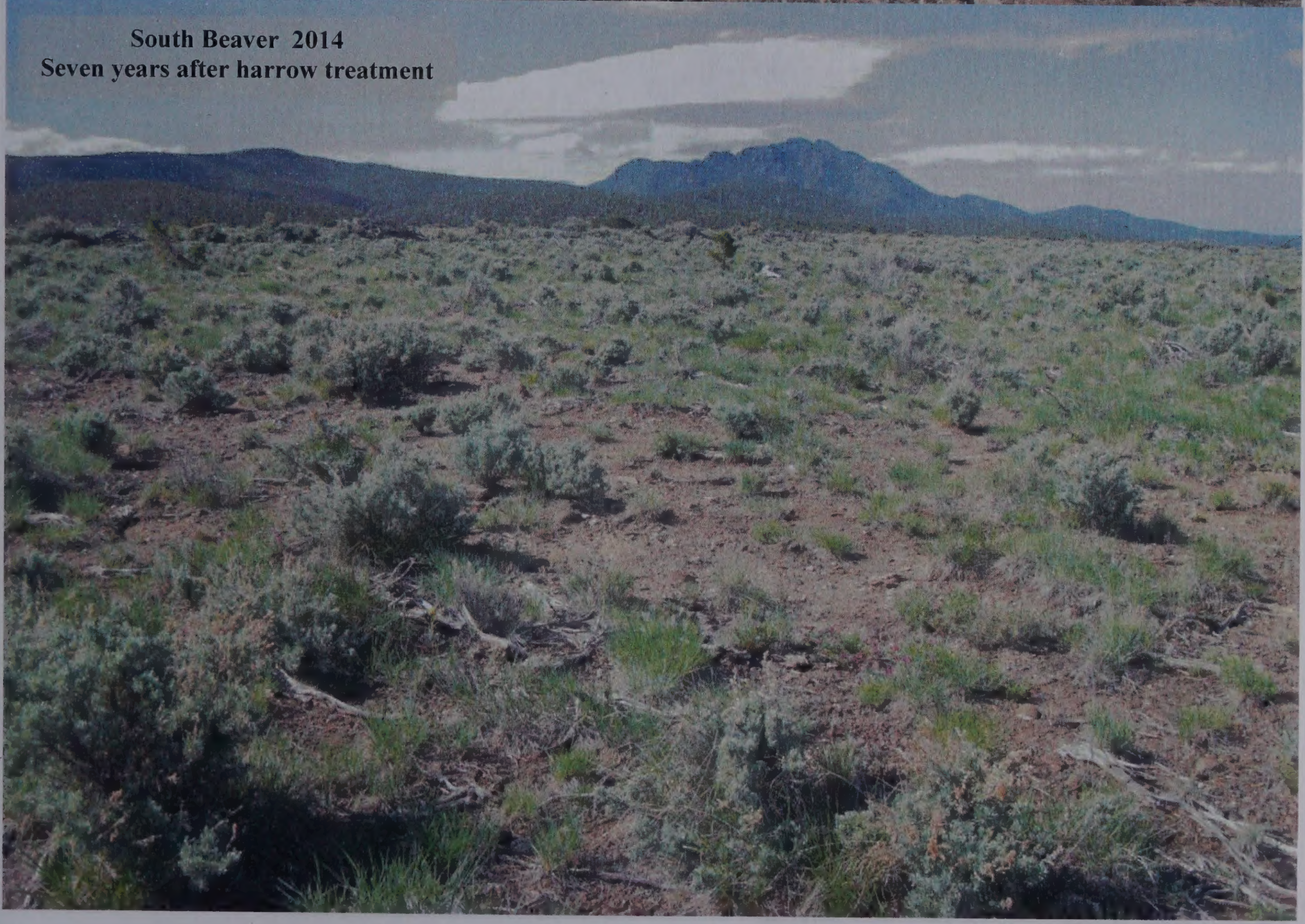
South Beaver 2015
After mastication


South Beaver 2011
Before mastication

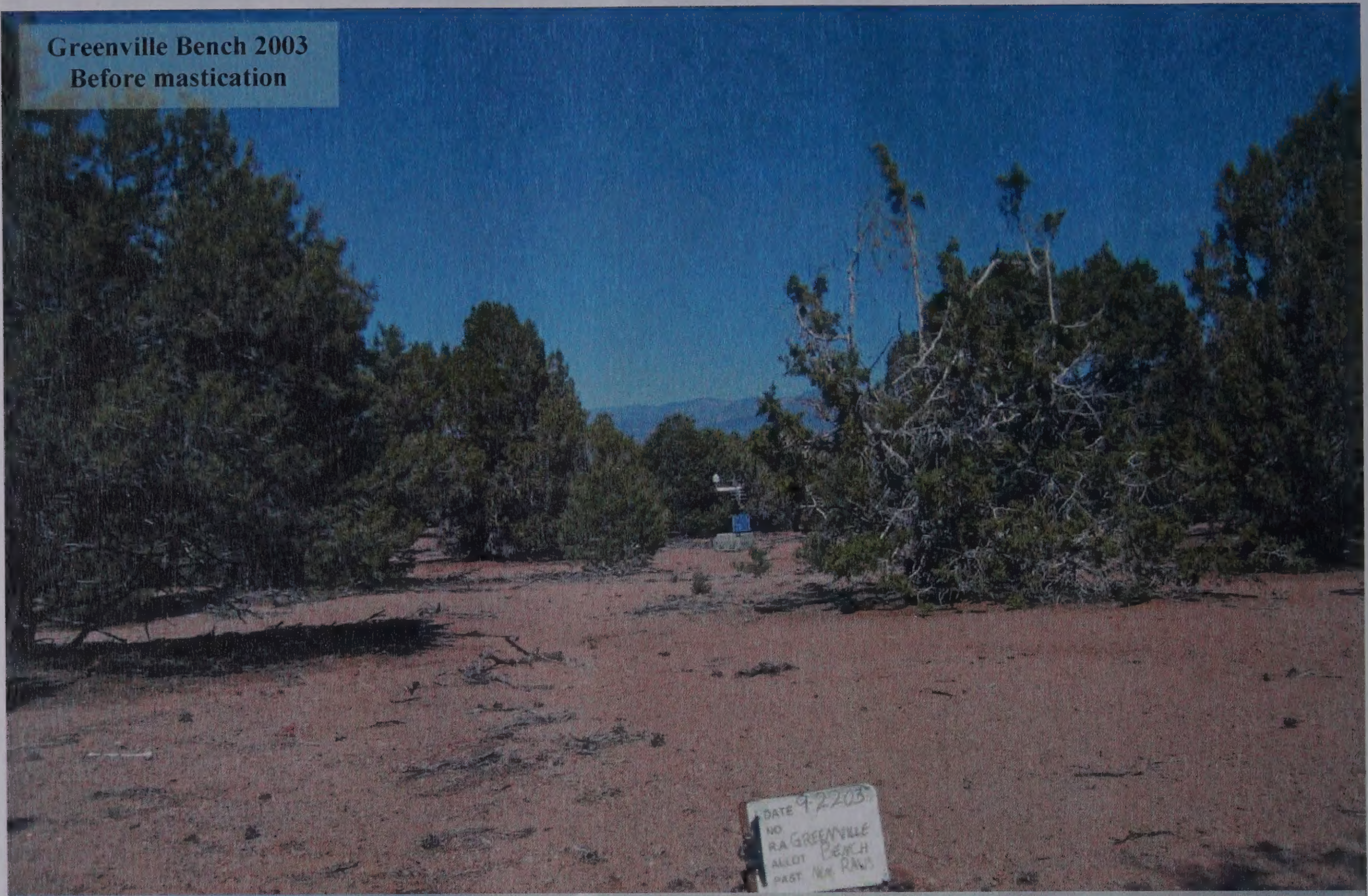

South Beaver 2012
After mastication



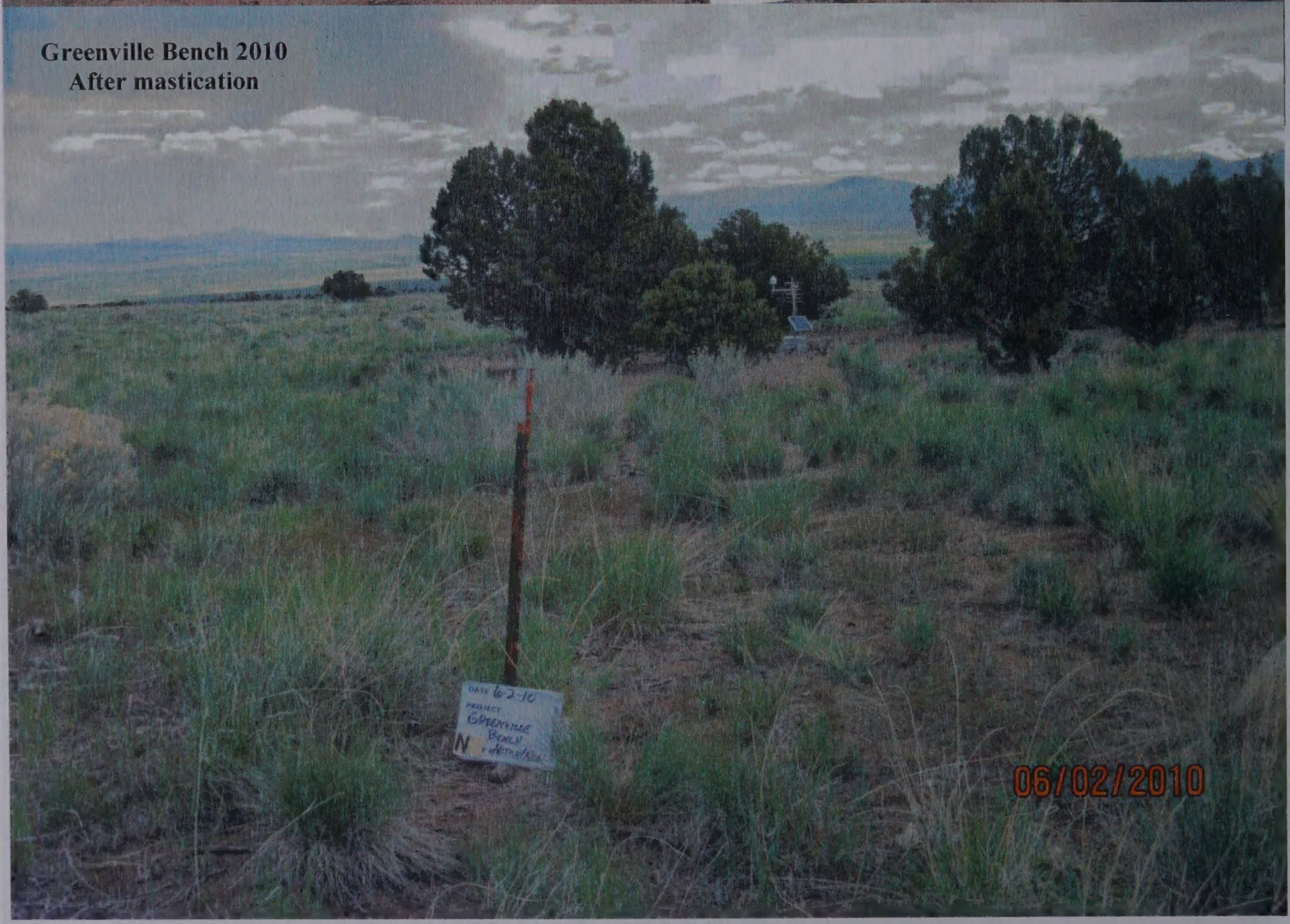
South Beaver 2008
One year after harrow treatment



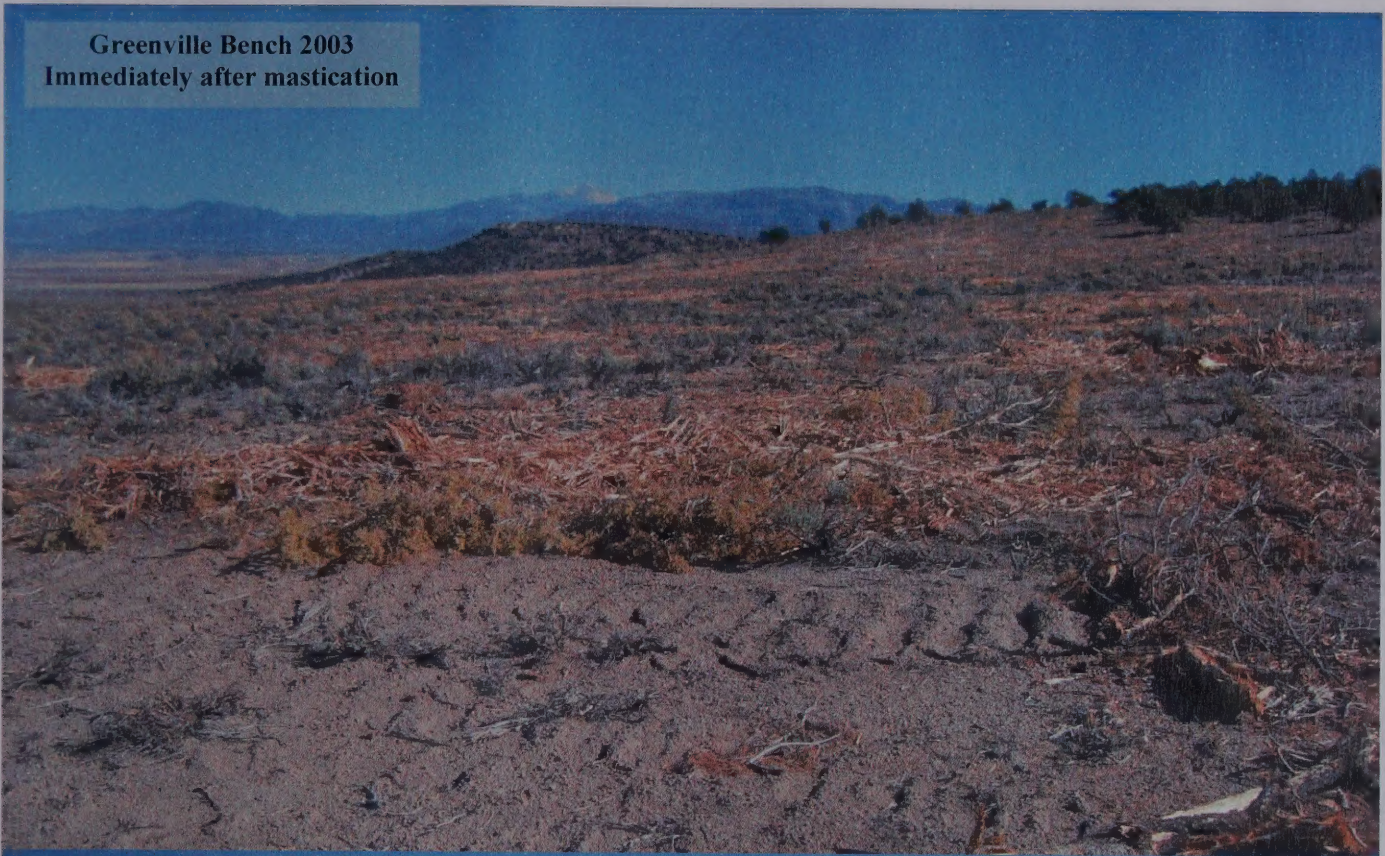
South Beaver 2014
Seven years after harrow treatment



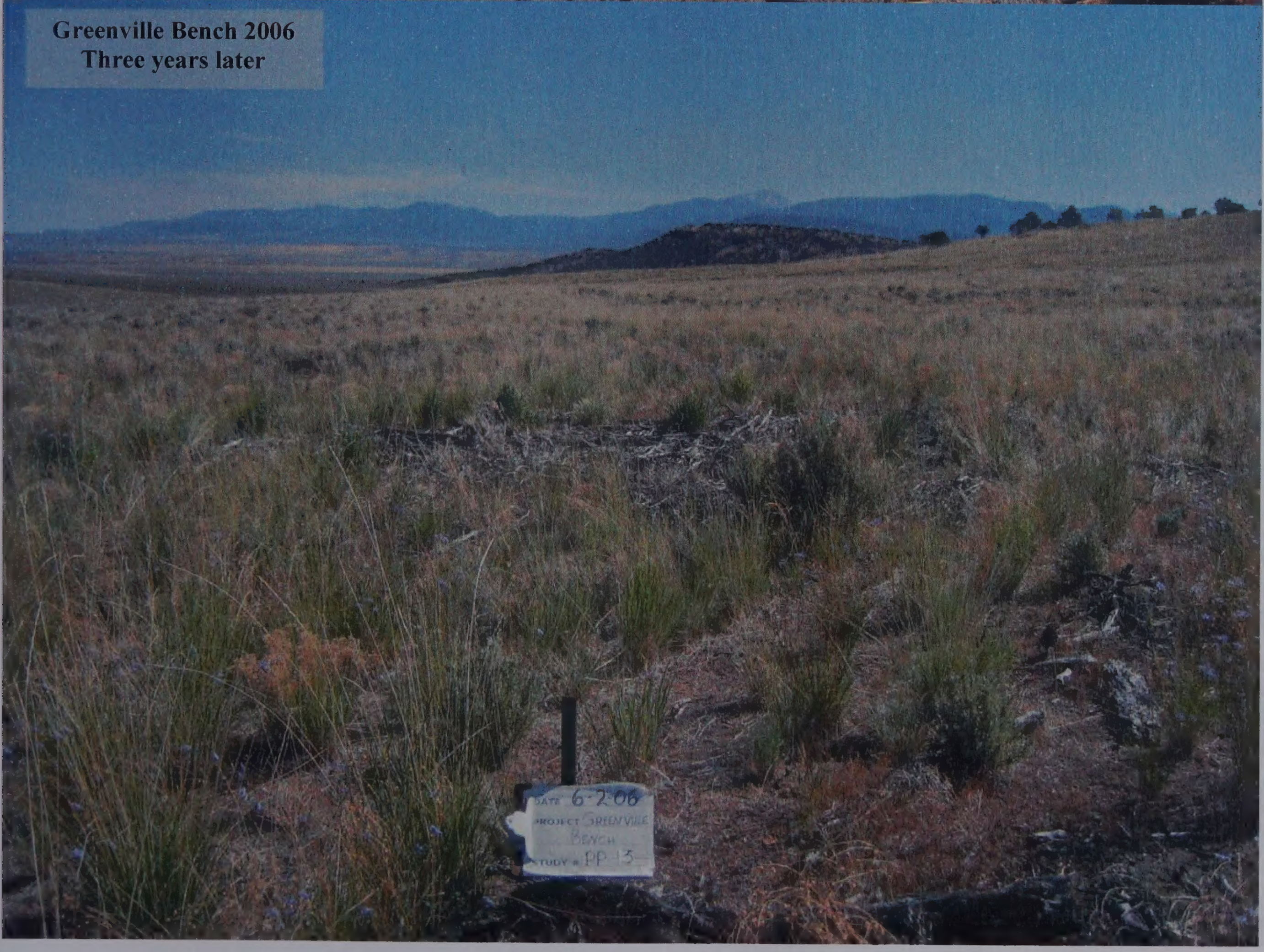
Greenville Bench 2003
Before mastication



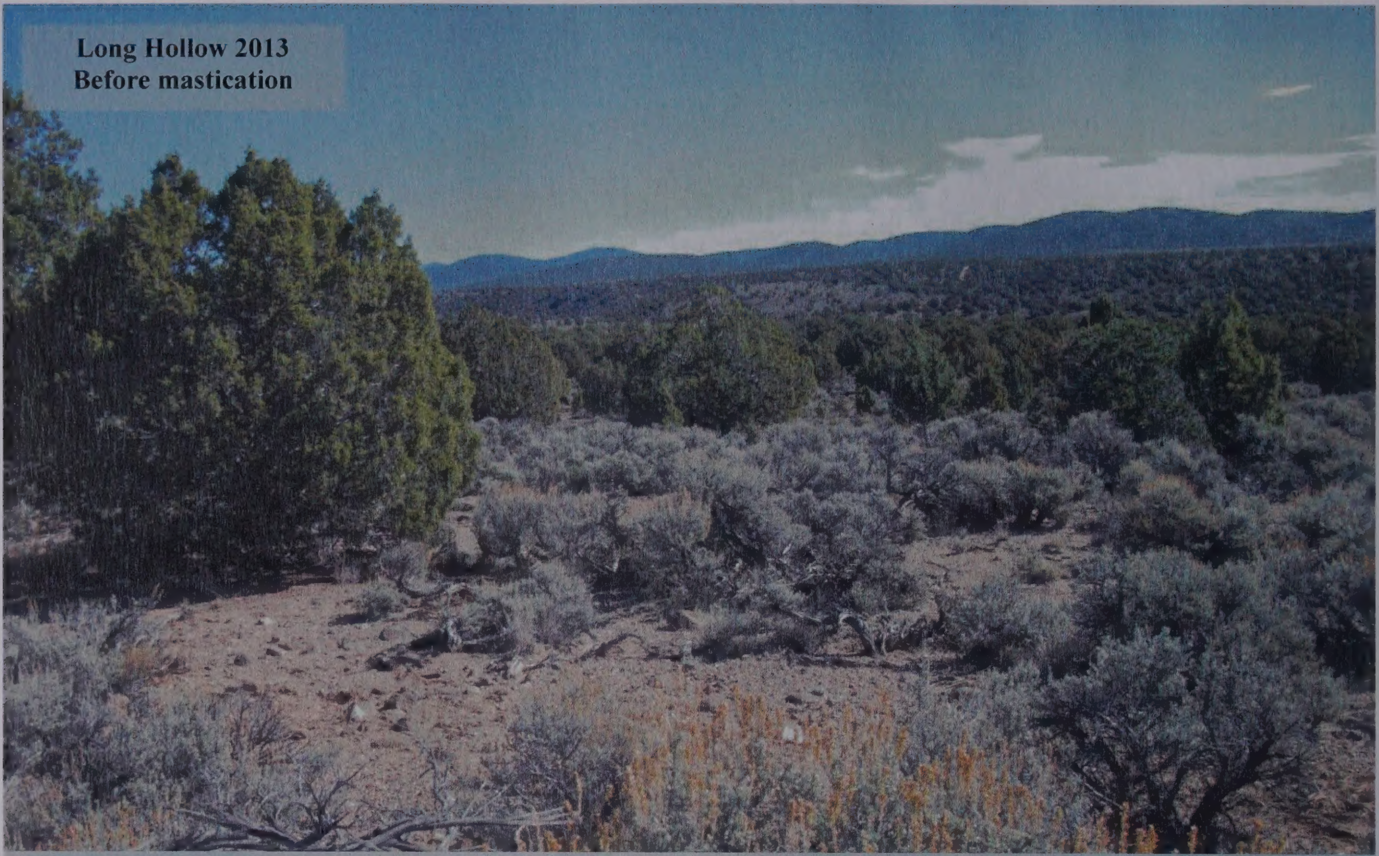
Greenville Bench 2010
After mastication



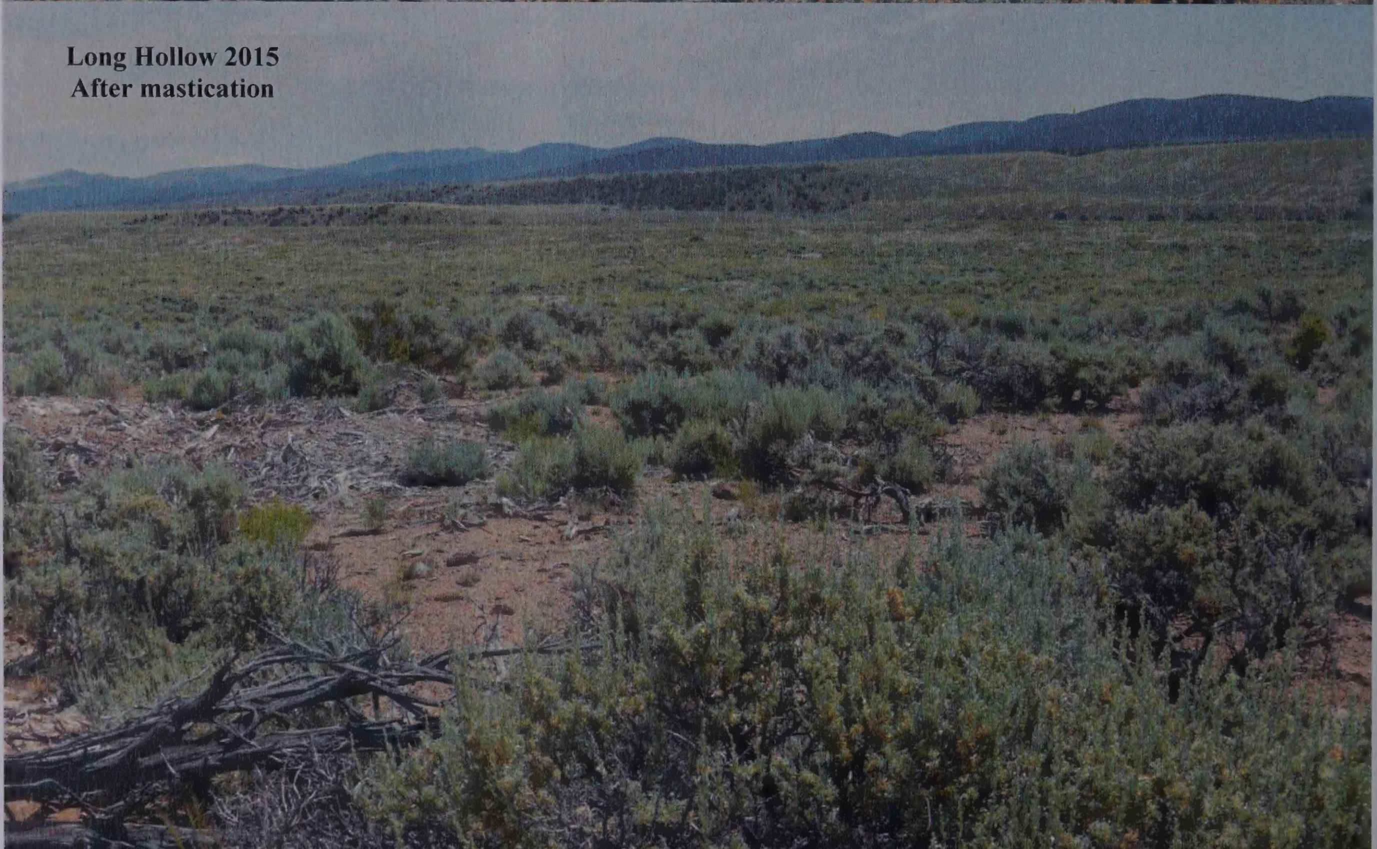
Greenville Bench 2003
Immediately after mastication



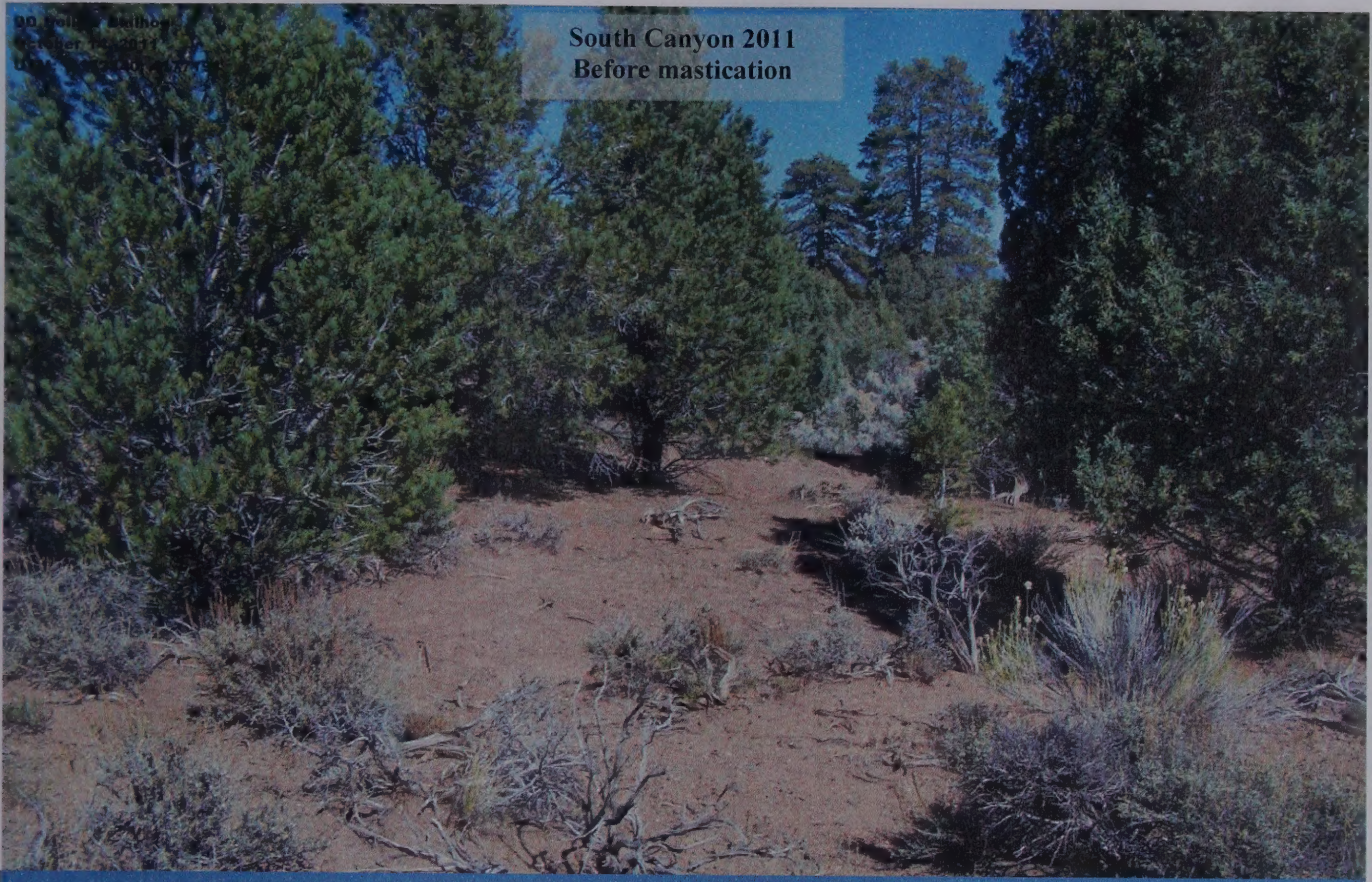
Greenville Bench 2006
Three years later



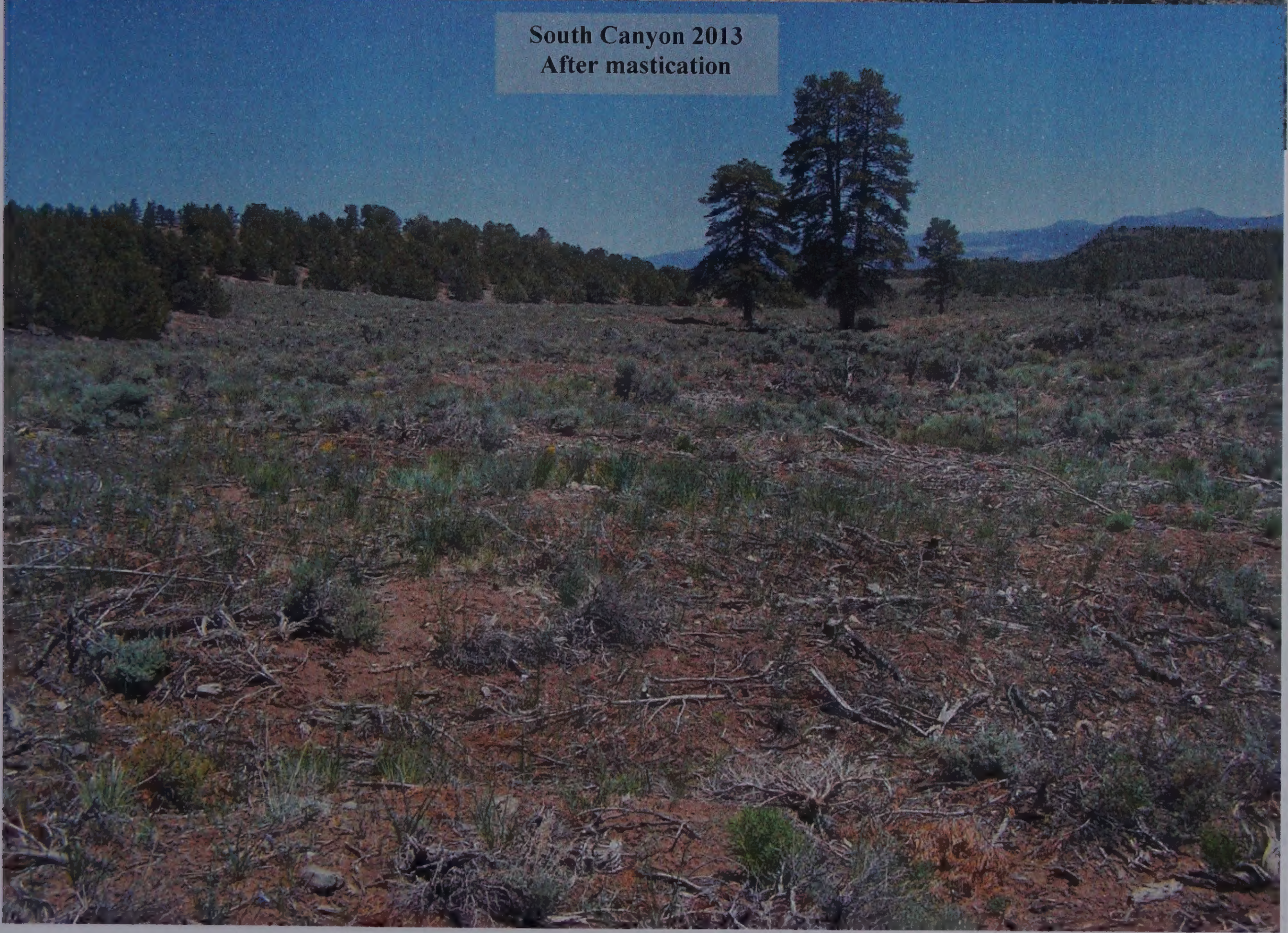
Long Hollow 2013
Before mastication



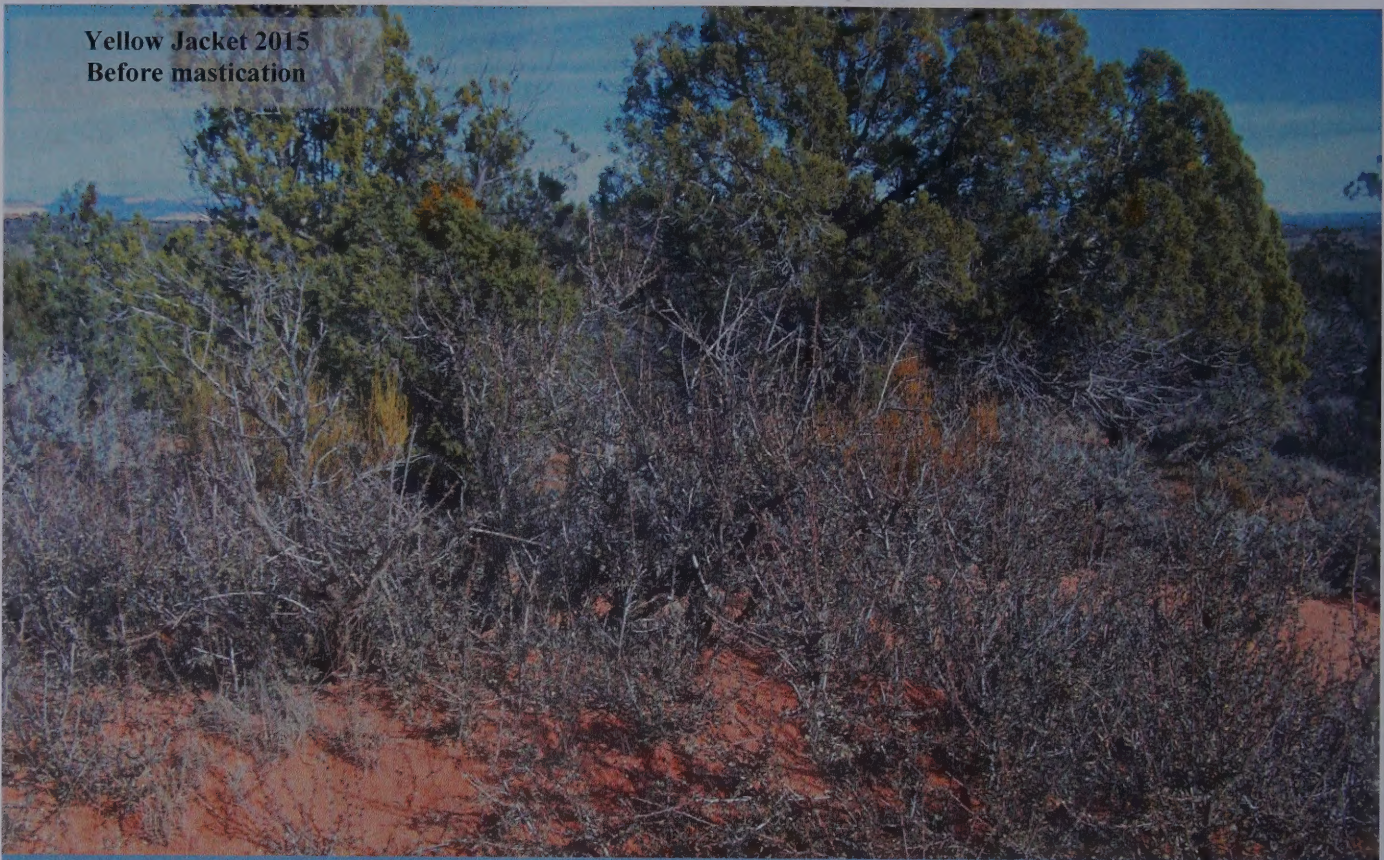
Long Hollow 2015
After mastication



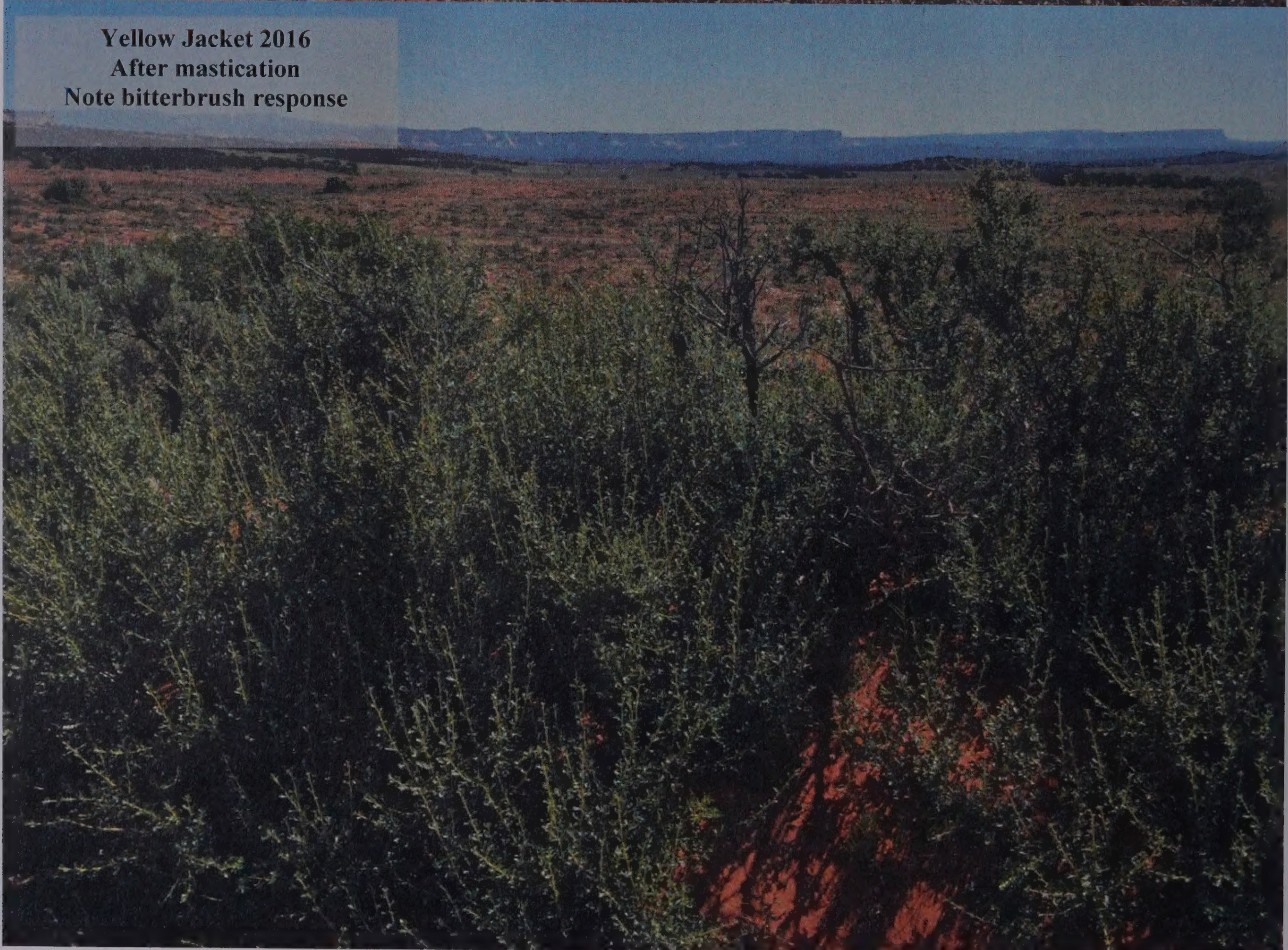
South Canyon 2011
Before mastication



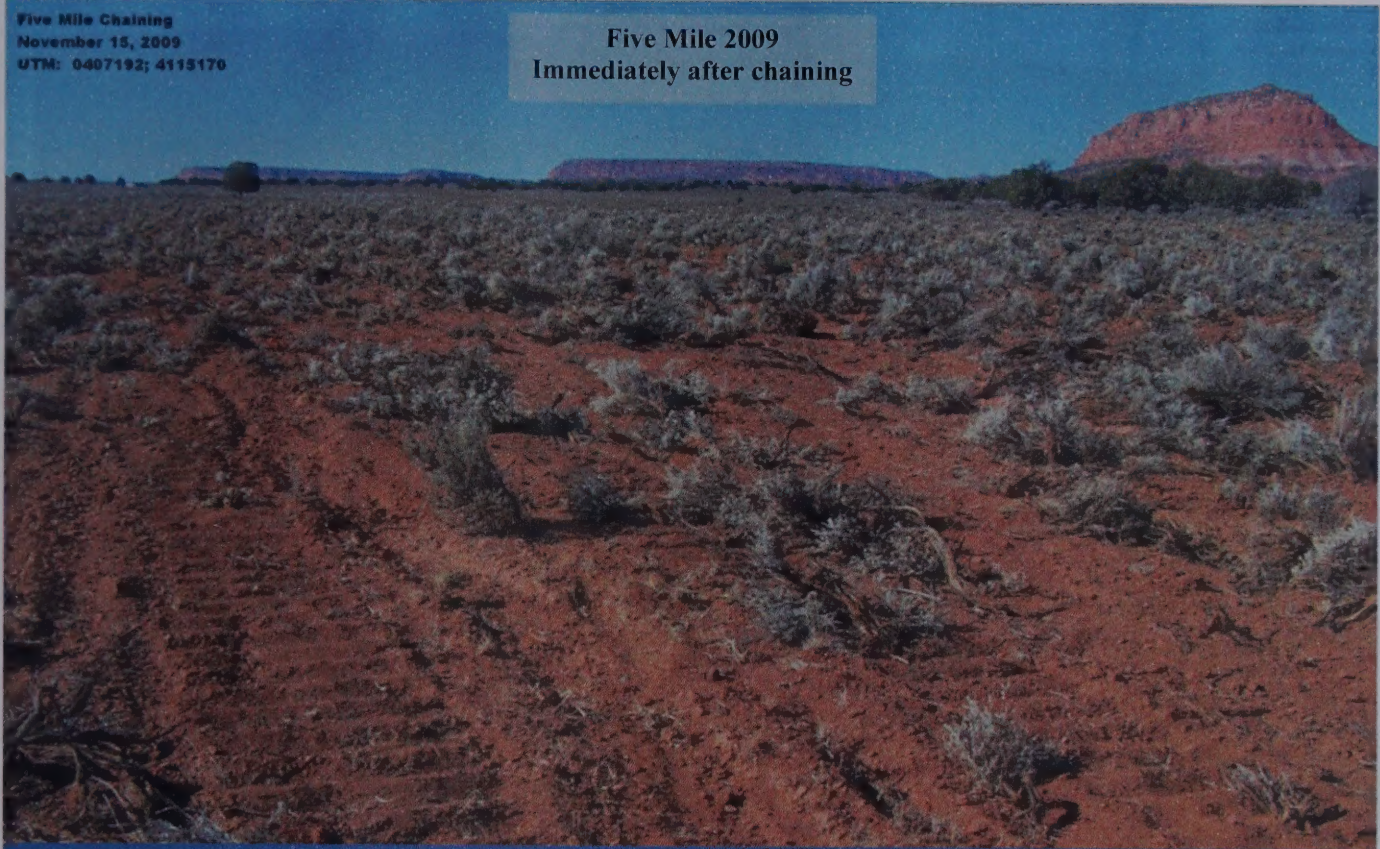
South Canyon 2013
After mastication



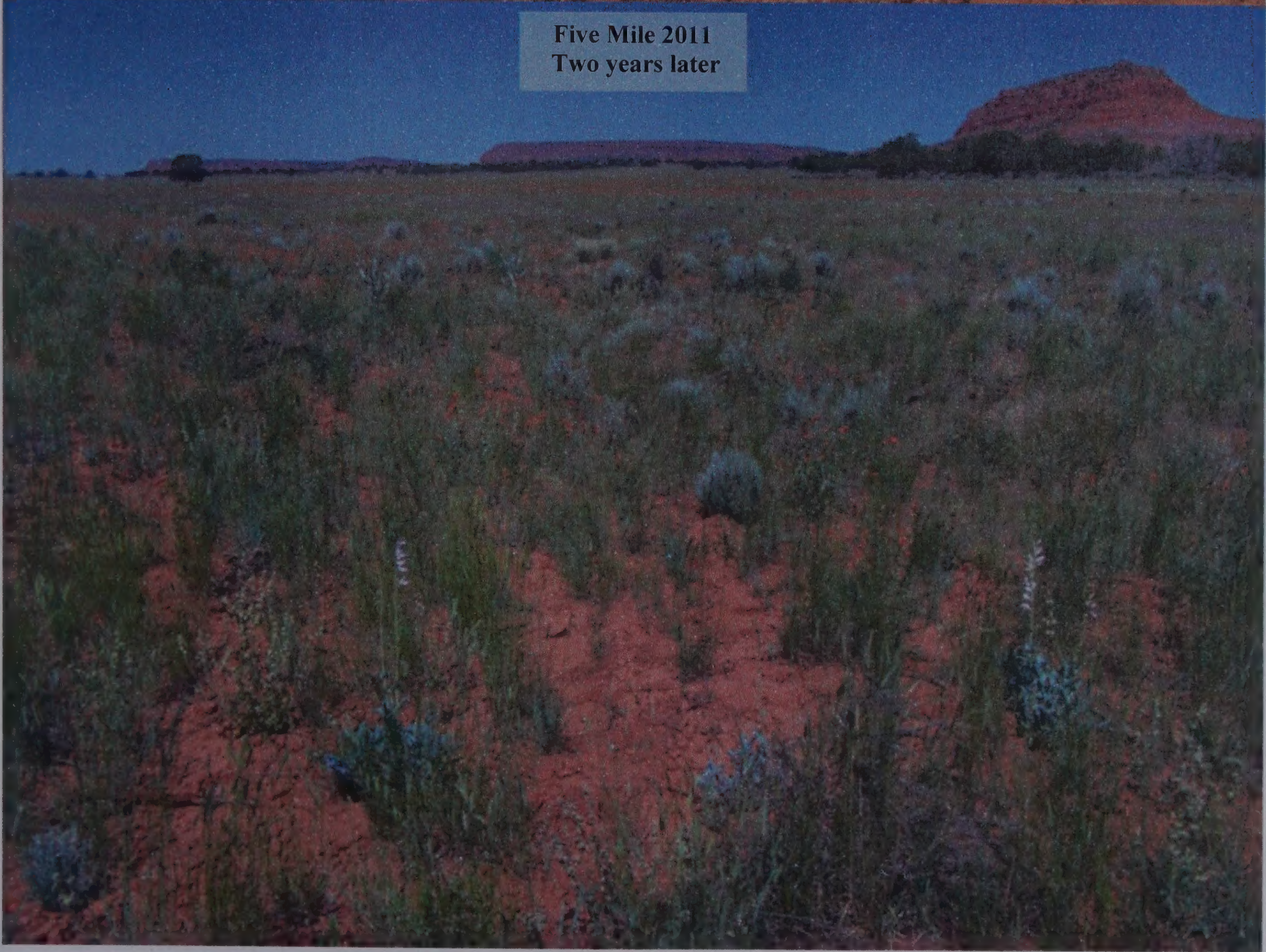
Yellow Jacket 2015
Before mastication



Yellow Jacket 2016
After mastication
Note bitterbrush response

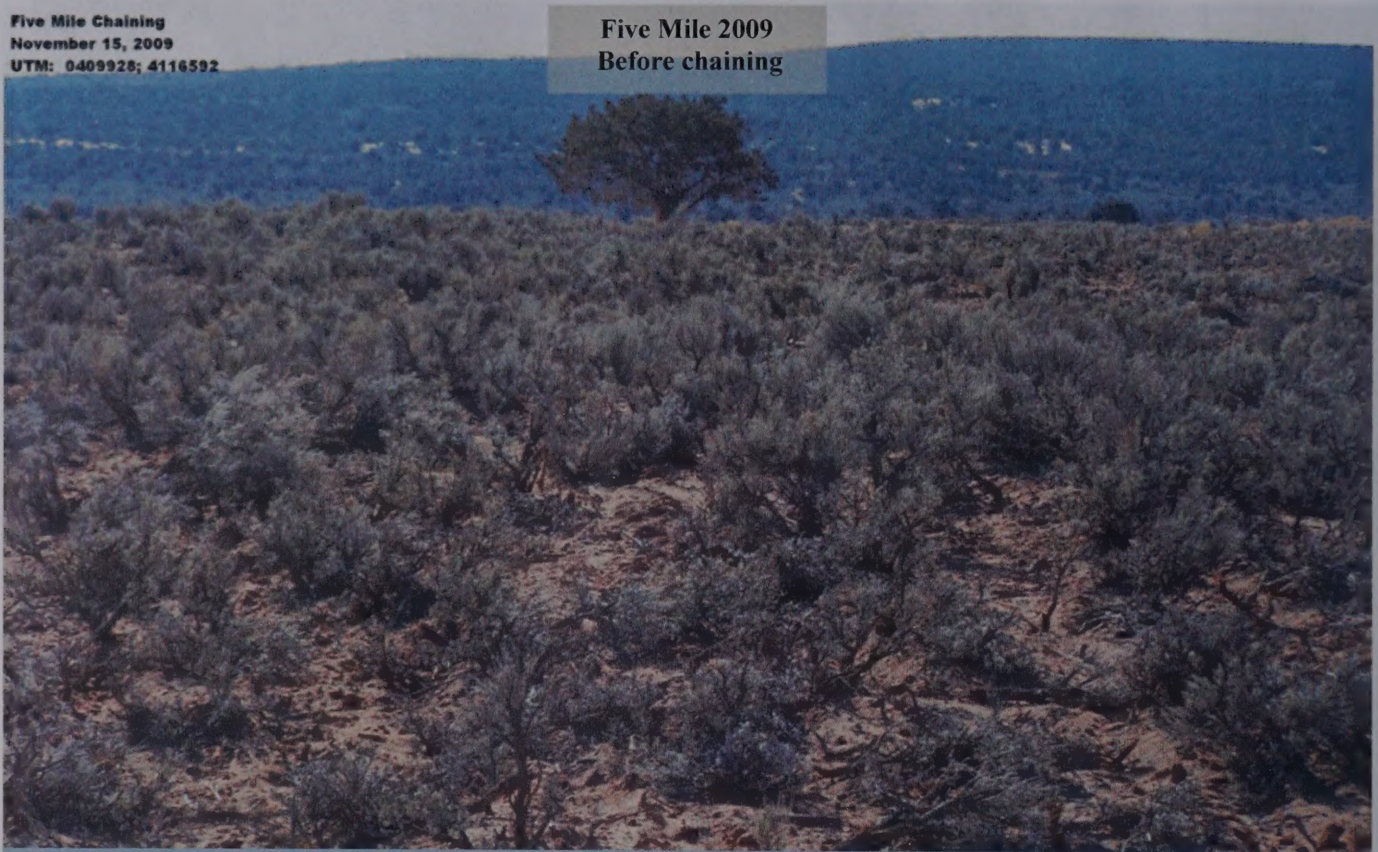


Five Mile 2009
Immediately after chaining

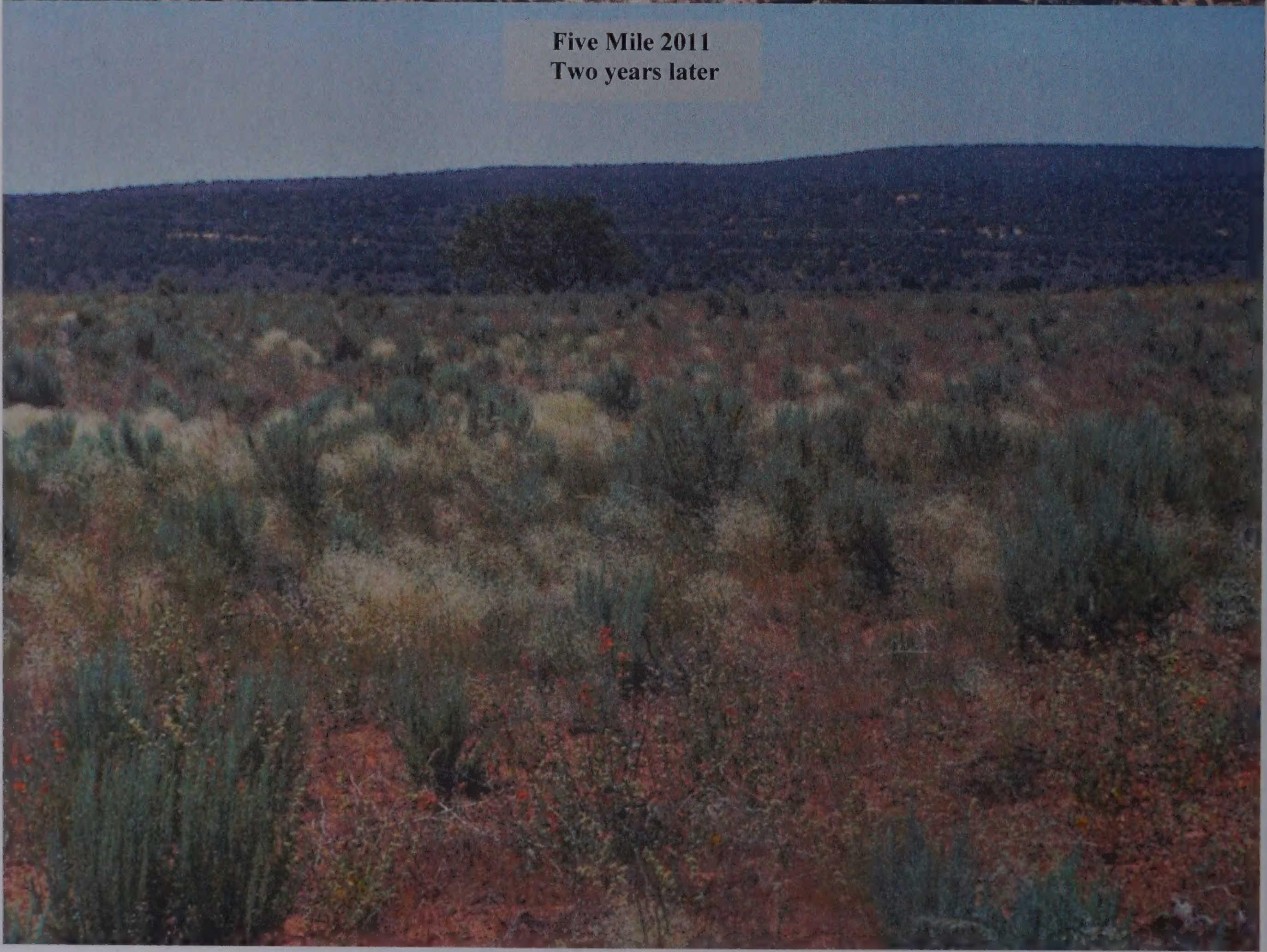


Five Mile 2011
Two years later

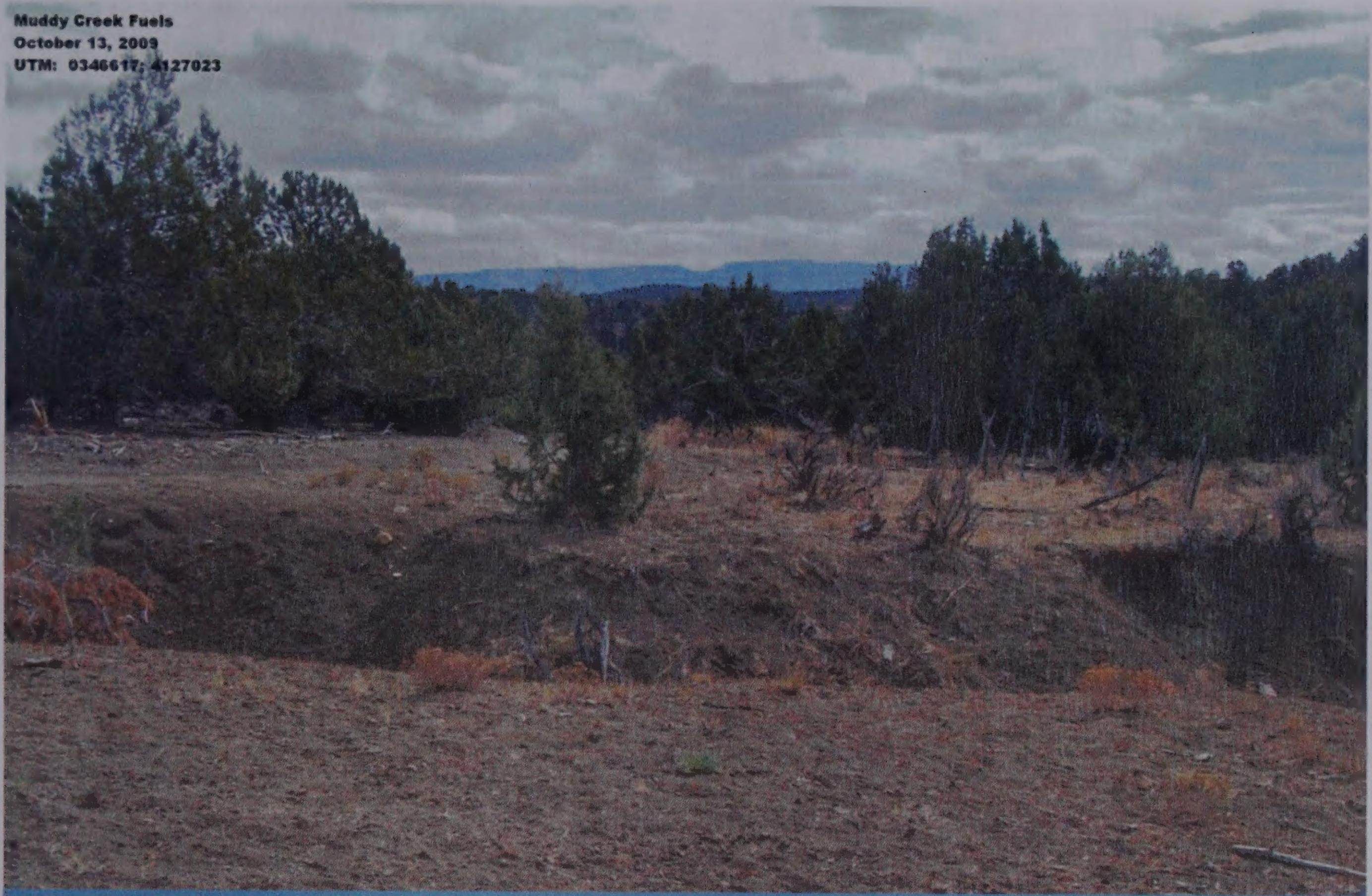
Five Mile Chaining
November 15, 2009
UTM: 0409928; 4116592

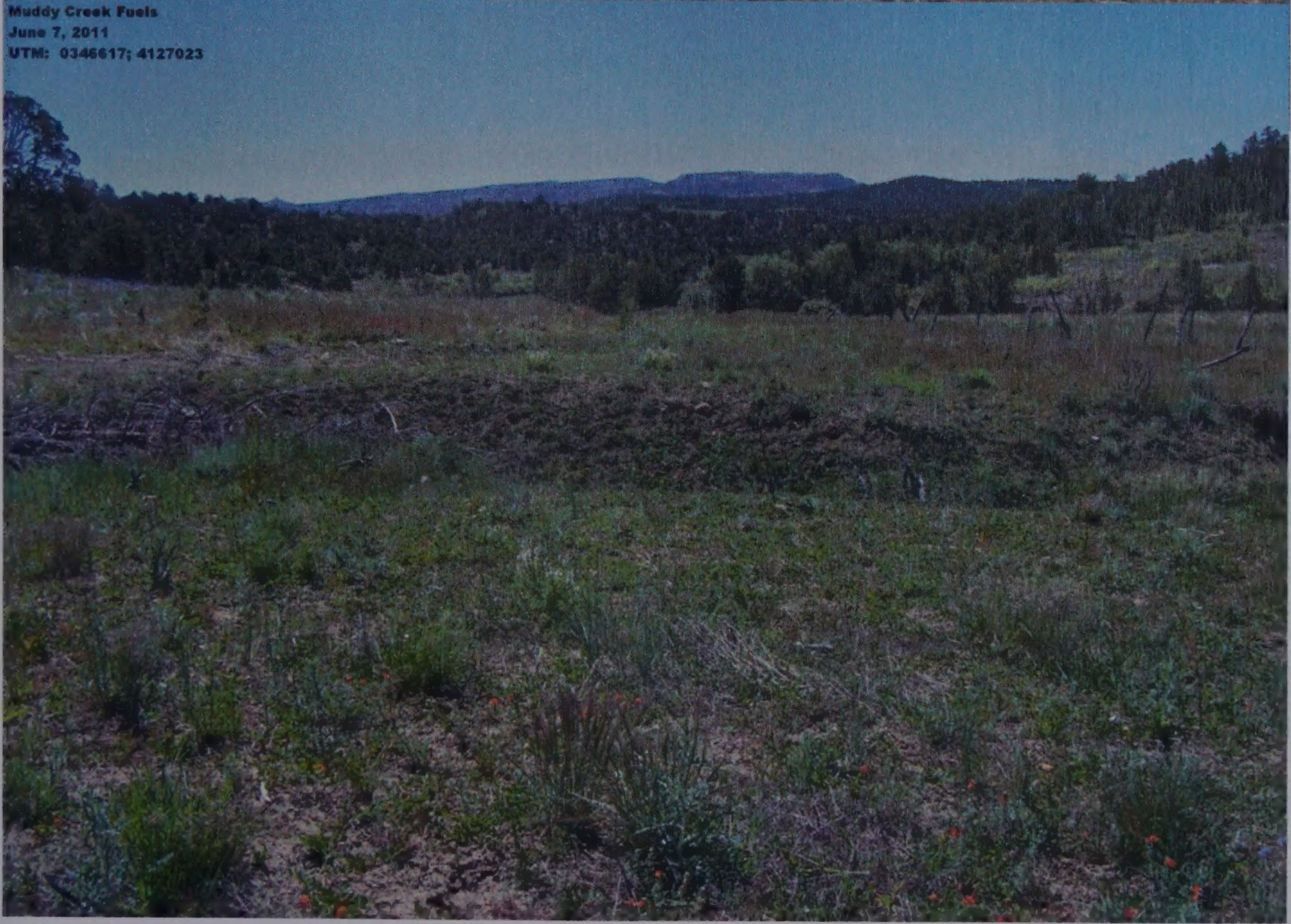


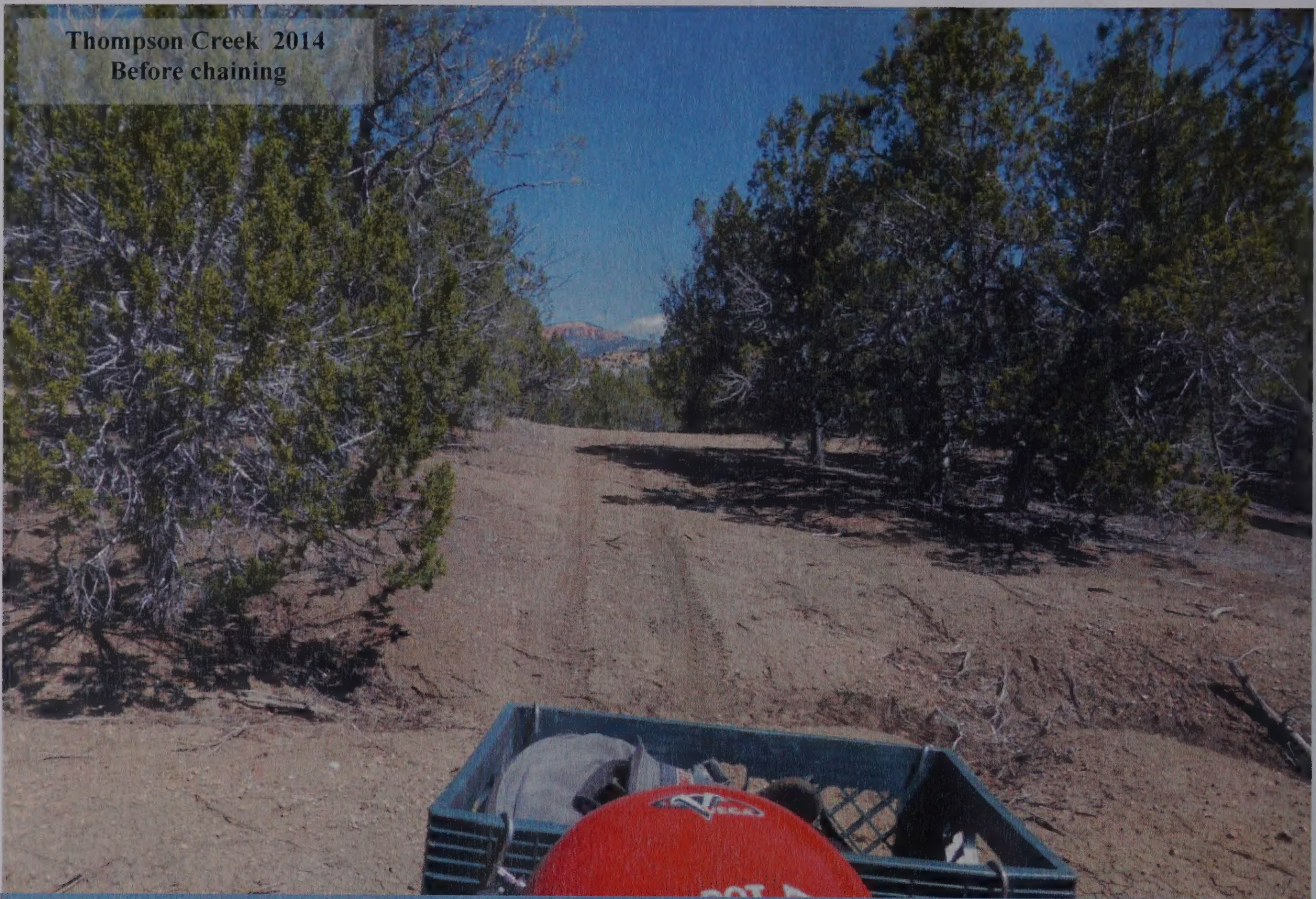
Five Mile 2009
Before chaining



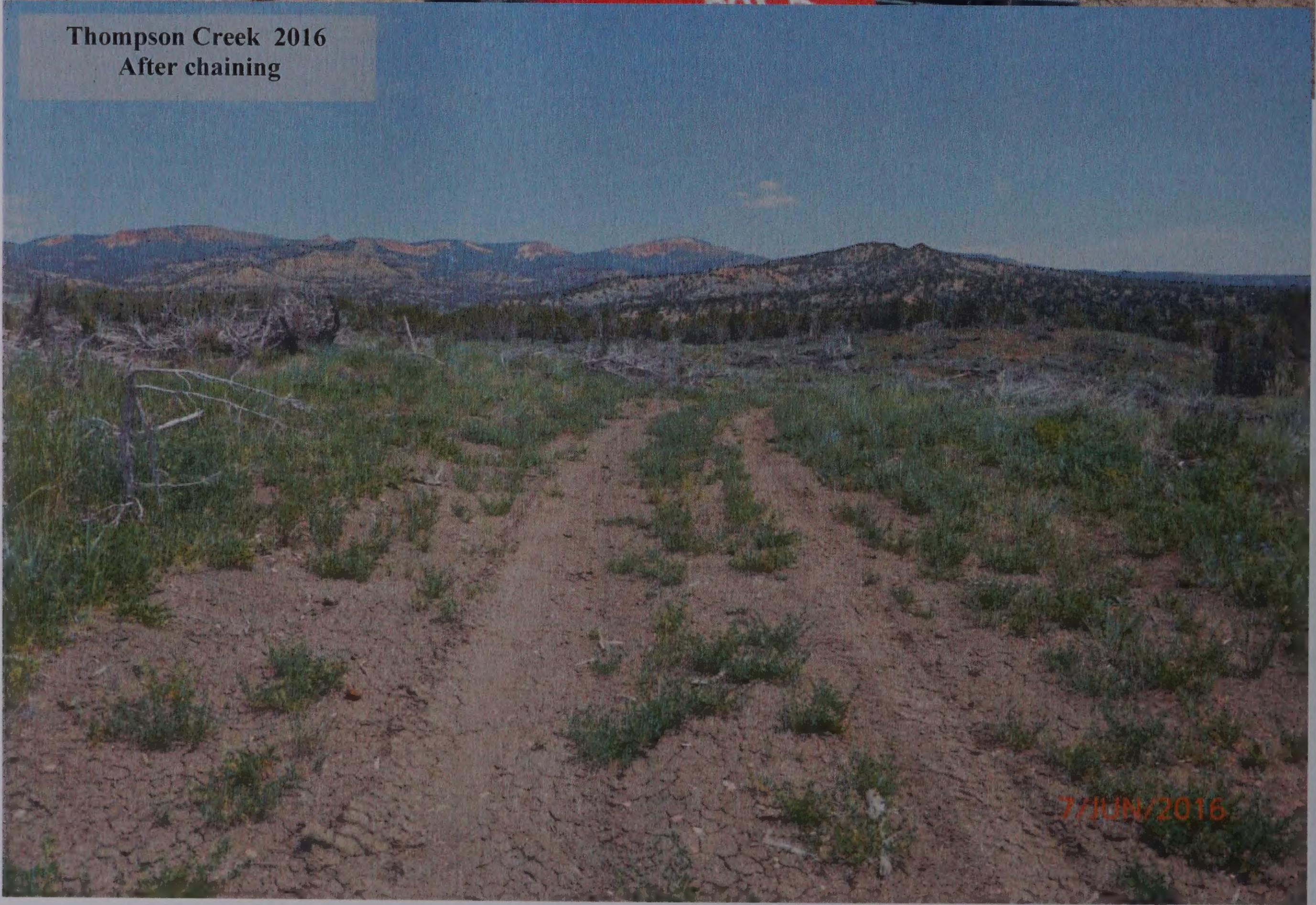
Five Mile 2011
Two years later


Muddy Creek Fuels
October 13, 2009
UTM: 0346617; 4127023


Muddy Creek Fuels
June 7, 2011
UTM: 0346617; 4127023

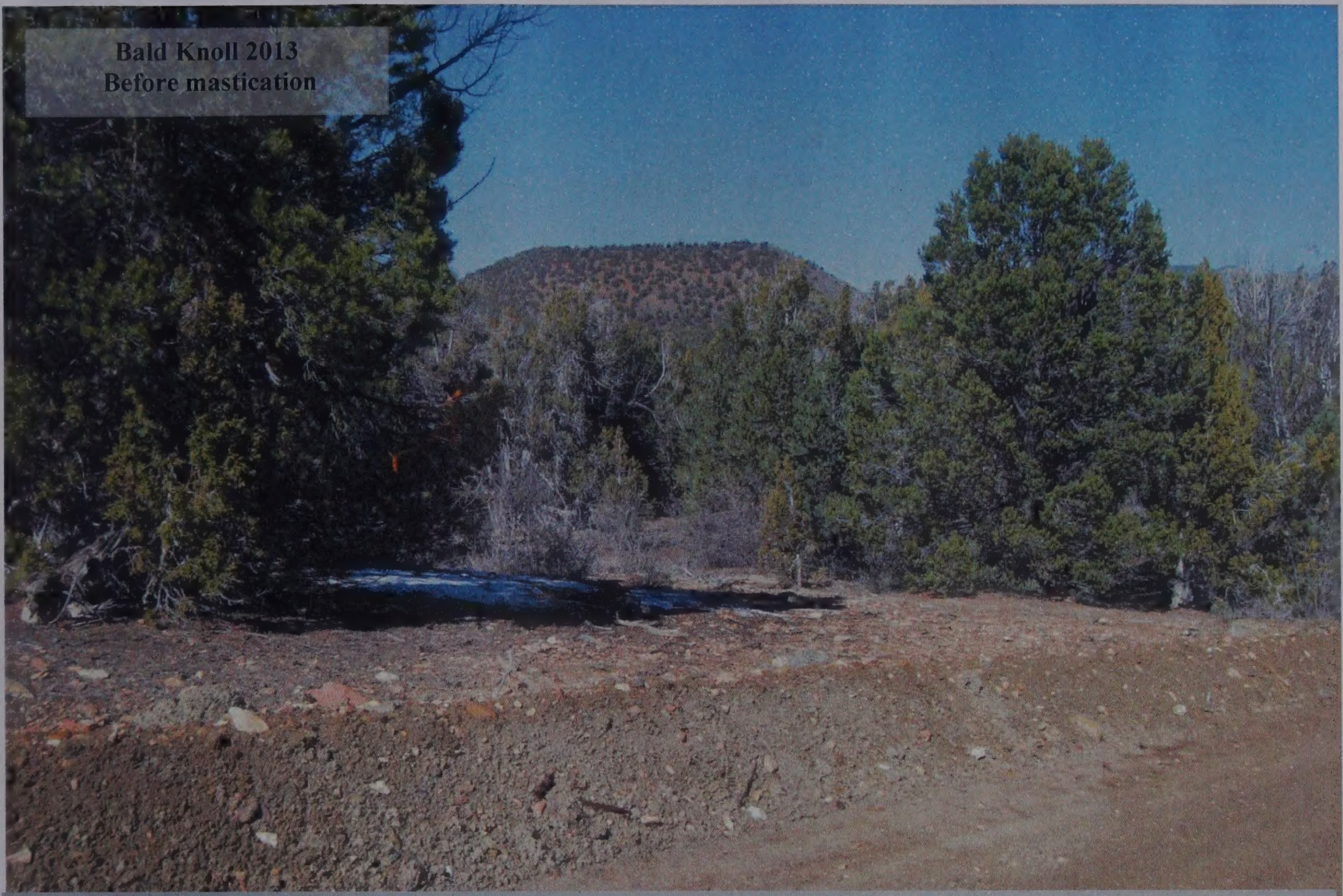


Thompson Creek 2014
Before chaining

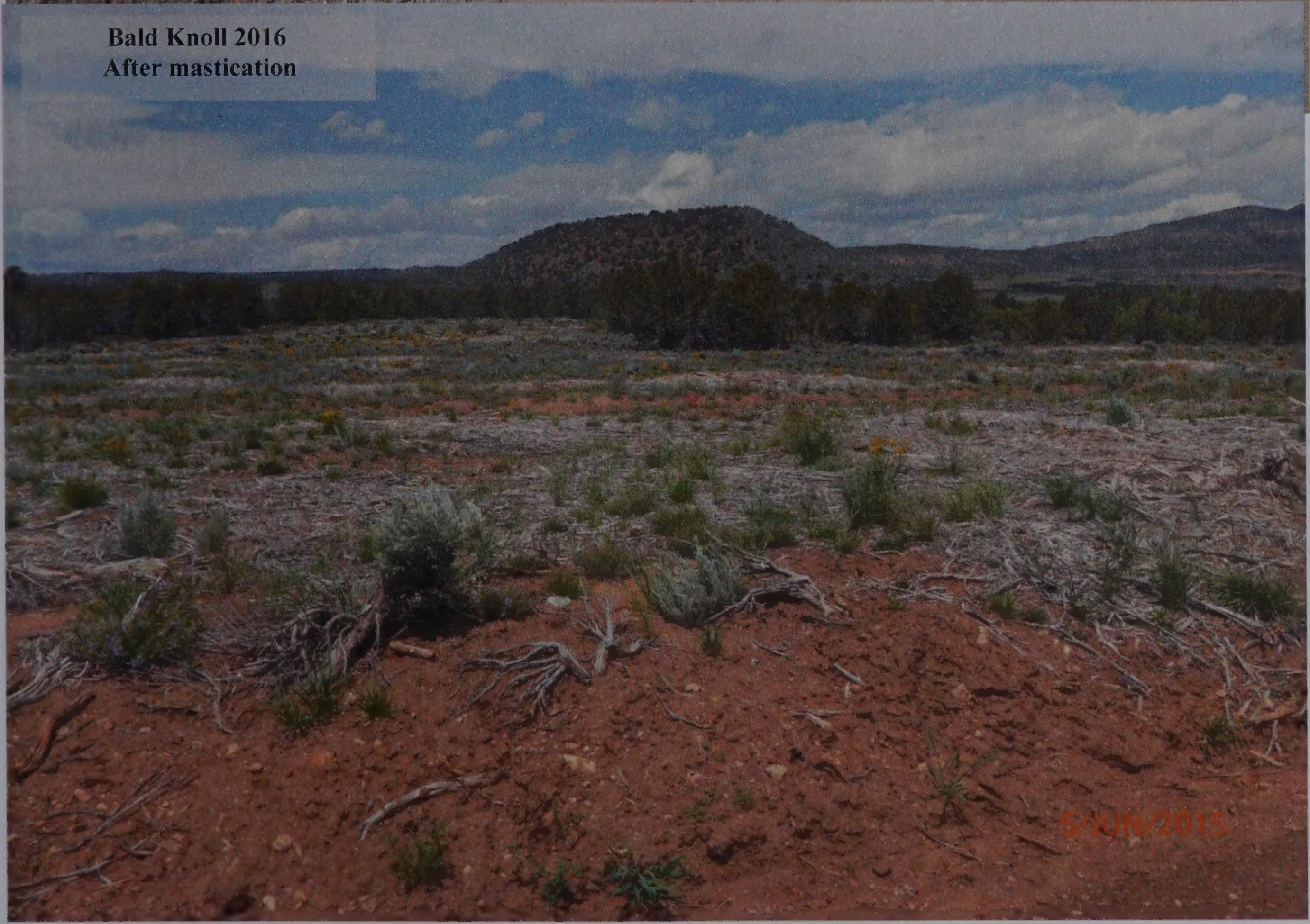


Thompson Creek 2016
After chaining

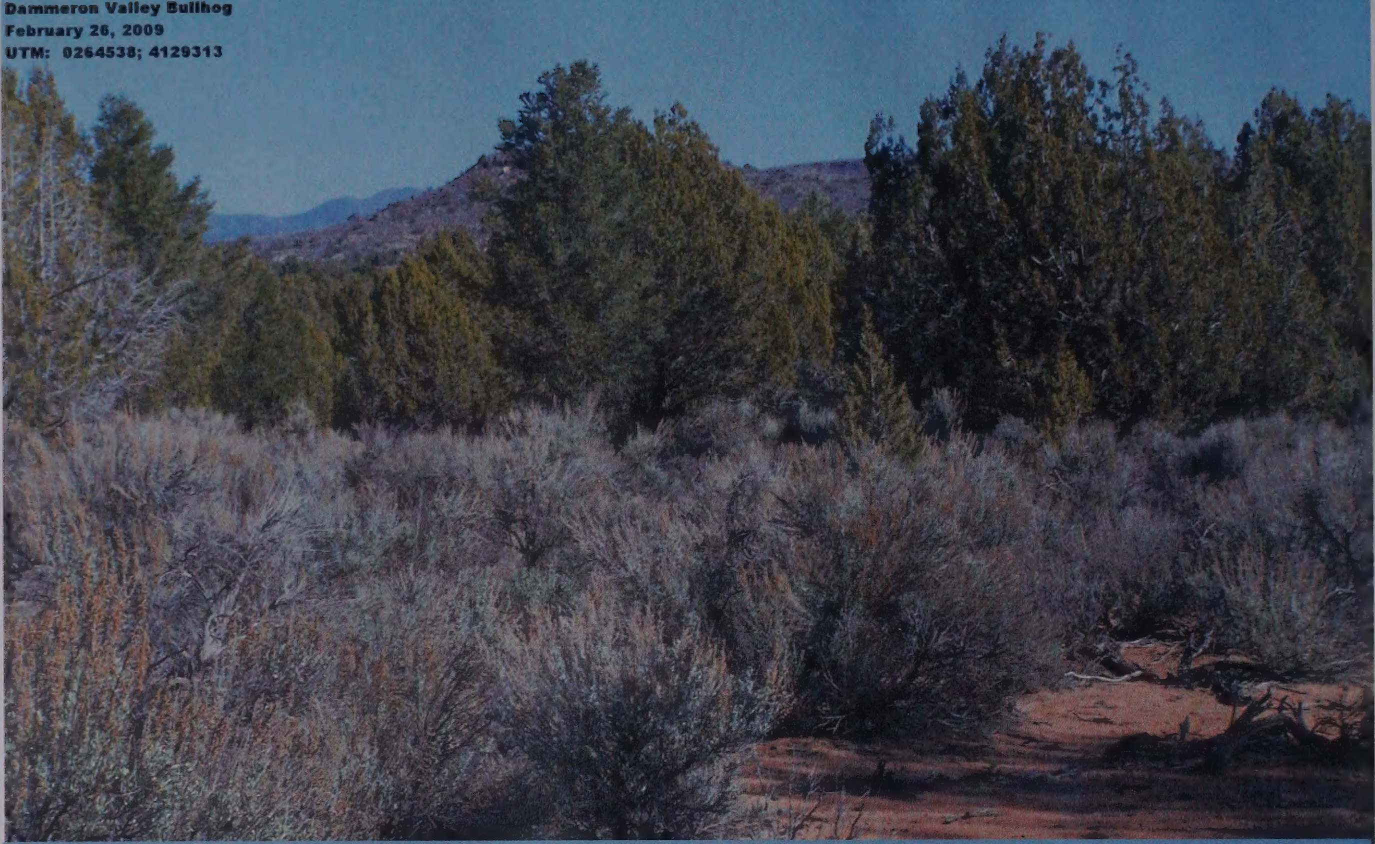
7/JUN/2016



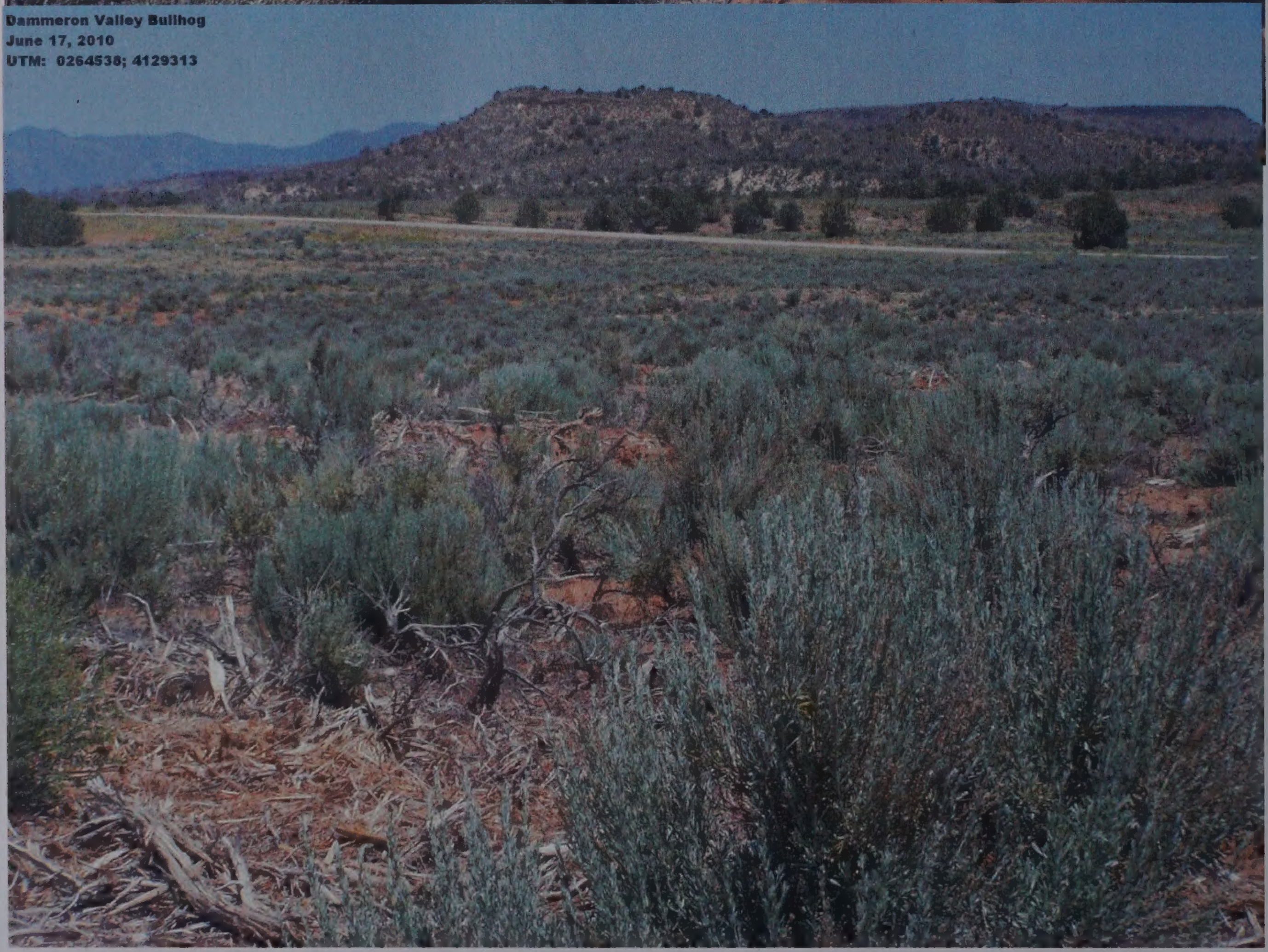
Bald Knoll 2013
Before mastication



Bald Knoll 2016
After mastication

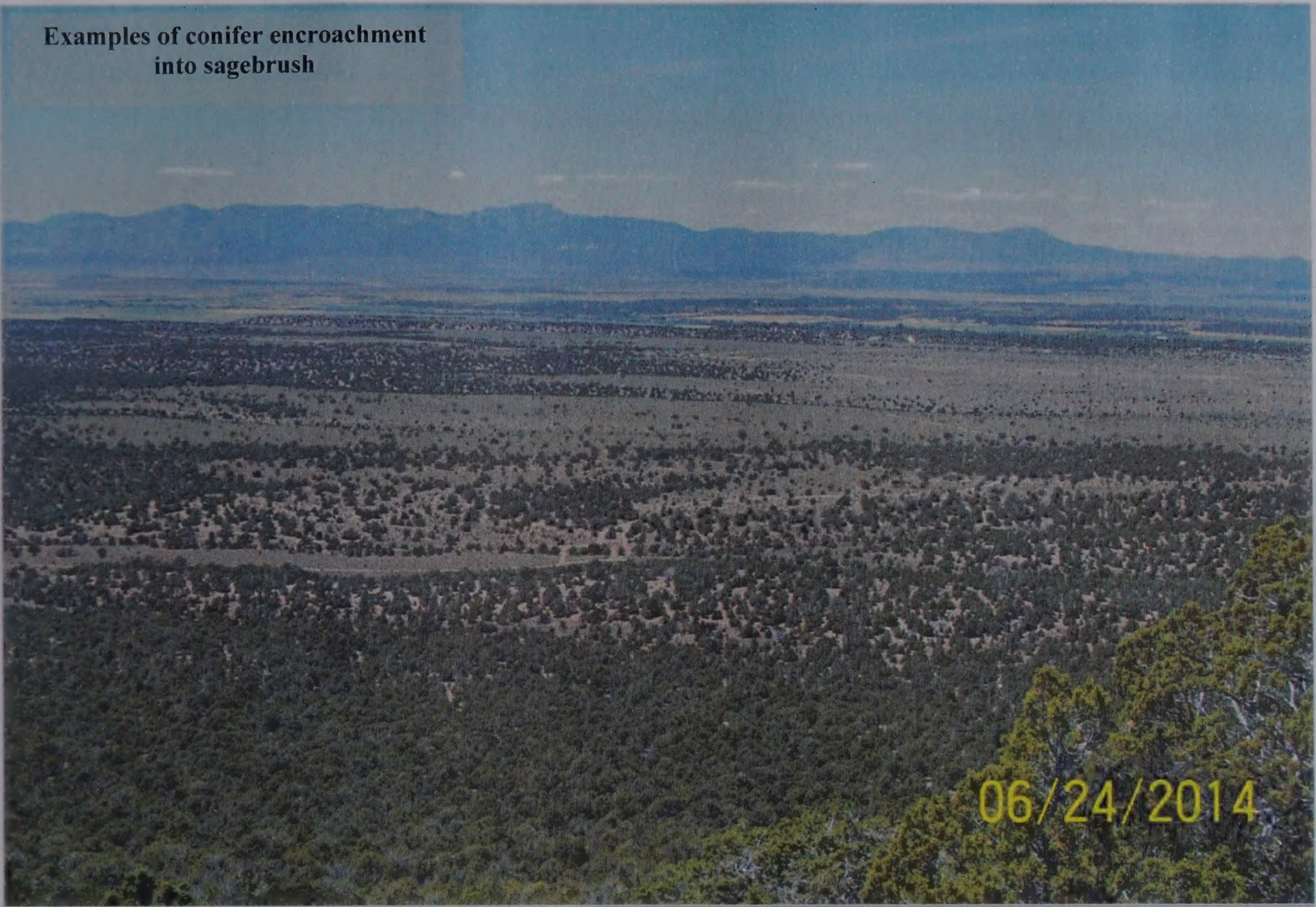


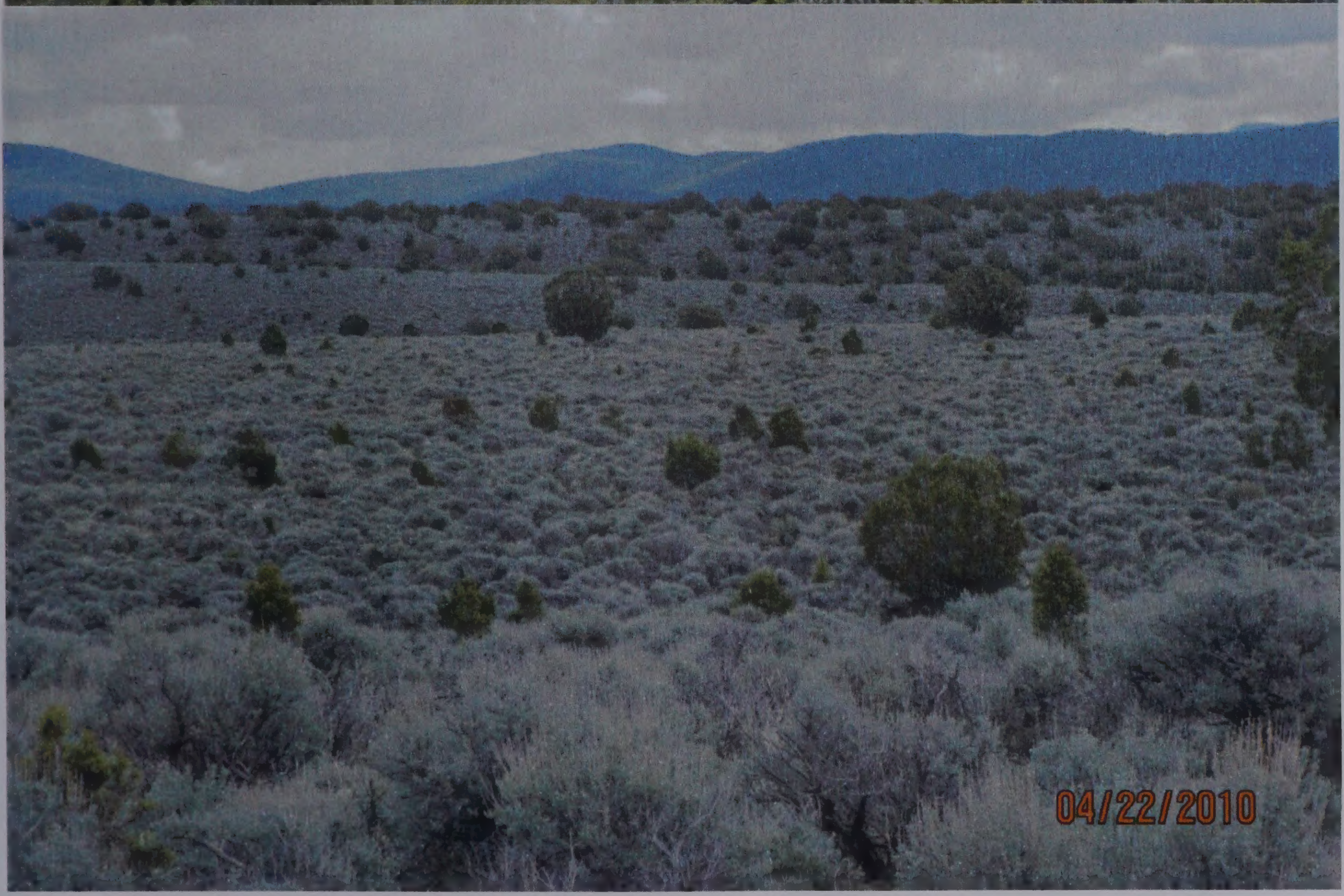
Dammeron Valley Bullhog
February 26, 2009
UTM: 0264538; 4129313

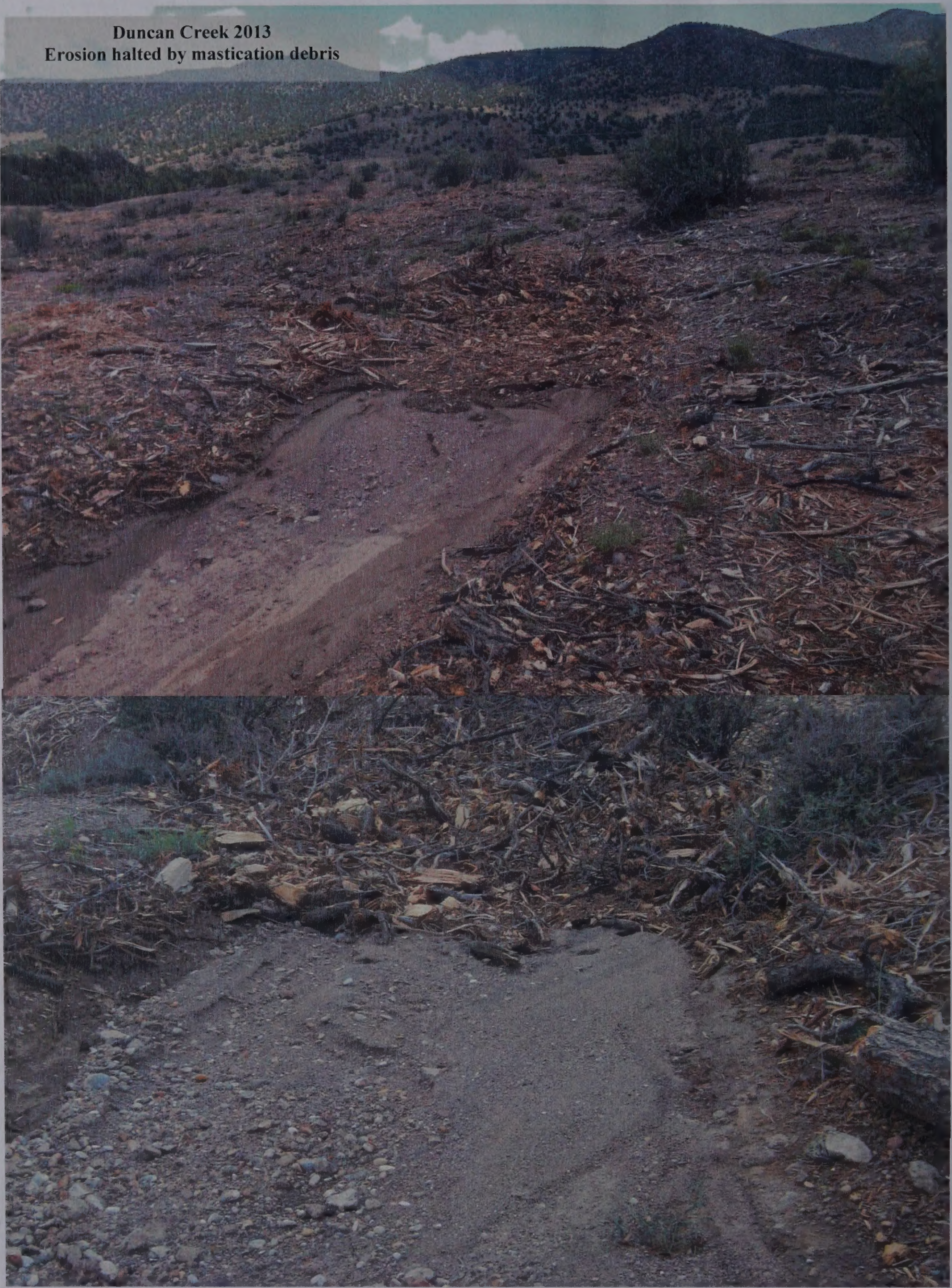


Dammeron Valley Bullhog
June 17, 2010
UTM: 0264538; 4129313

Examples of conifer encroachment into sagebrush







Duncan Creek 2013
Erosion halted by mastication debris